WORLD

NTHETIC

MARCH, 1944

Newsletter No. 3
MARCH, 1944

Published by Rubber Chemicals Division of DU PONT

Heliozone Retards Sun Checking of GR-S Vulcanizates

GR-S VULCANIZATES which are to be used out-of-doors should be protected by the inclusion of a sun-checking inhibitor in the compound. When such a protective ingredient is not included, the stocks will crack readily when exposed to either direct or reflected sunlight.

DYNAMIC SERVICE—The sun checking of vulcanizates in static service, however, is not as serious as the failure resulting when such stocks are subsequently flexed or deformed. Serious failure due to flexing occurs in GR-S vulcanizates only after the surface has been injured. Surface cracking due to sun checking is a major disadvantage since the surface-cracks grow rapidly in dynamic service.

Although it is impossible to guard against all of the hazards that cause cuts or cracks in products such as belts, footwear, coated fabrics and tires, it is entirely possible to protect GR-S from sun checking by the addition of small quantities of Heliozone to the GR-S compound.

HELIOZONE EFFECTIVE—Heliozone has been of considerable advantage in improving the sun-checking resistance of natural rubber. It has even greater possibilities in GR-S stocks where all possible measures must be taken to retard the formation of small cracks or checks.

Heliozone is made from a specially selected group of waxy materials and has a specific gravity of 0.90 and a melting point of about 67° C. Because it melts at mixing temperatures, it disperses easily in the stock. Heliozone functions by blooming to the surface after cure, forming a smooth, continuous, transparent, colorless, plastic film which can be scraped off only with difficulty. The film retains its flexibility at temperatures as low as 0° F., and does not melt and disappear into the GR-S at hot summer temperatures.

Colors for GR-S and Neoprene

DU PONT RUBBER COLORS, like many other materials, have been hit by war, and their use in products for civilian needs during the past two years has been sharply curtailed by Government regulations. There is a growing tendency toward the increased use of colors now that some of the restrictions are being eased. Looking into the future, further heavy demands for colors may be anticipated to meet the varied tastes and fancies of the consuming public once the clouds of war are dispersed and the world is again bright.

The bombing of Pearl Harbor interrupted our program of introducing a de luxe line of rubber colors. This program was intended to supply the industry with a selected few high-quality colors in both dry powder and dispersed form. For obvious reasons, production of rubber dispersed colors was discontinued but will be resumed as soon as conditions permit. Limited quantities of several rubber dispersed colors are still available and these may be used as desired.

Development work on dry powder colors has not abated and a full line of de luxe colors is now available. The following all-purpose colors are recommended:

Colors for Dry Rubber, Neoprene and Other Synthetic Elastomers

Rubber Red WRT
Rubber Red 2B
Rubber Orange F
Rubber Yellow G
Rubber Monastral Fast Green GS
Rubber Monastral Fast Blue CP
Rubber Blue YDE

Colors for Neoprene or Rubber Latex

Rubber Red WRT
Rubber Red 2B
Rubber Orange OT
Rubber Yellow HN
Rubber Monastral Fast Green GS
Rubber Monastral Fast Blue CP
Rubber Blue YDE
Rubber Blue N

These colors were selected with regard to their cleanness of shade, stability to varying curing conditions, fastness to light, freedom from bleeding and migration, ease of dispersion, and other properties that are desirable in dry rubber and latex compounds. When properly blended, they provide the compounder with almost any hue, shade or tint in the visible spectrum. The cost of these colors based on tinctorial power is in many cases lower than that of cheaper colors having less desirable properties.

Du Pont rubber colors may be used with equally satisfactory results in rubber, neoprene or GR-S. The latter two elastomers, however, contain chemical stabilizers which cause their vulcanizates to darken slightly on exposure to light. For this reason, the shade of finished colored articles made from these two elastomers will change regardless of the light-fastness of the color used. The use of white pigments in the compound is recommended to minimize the discoloration caused by exposure to light and to enhance the brightness of the finished article. Where a minimum of discoloration is essential, we suggest the use of Neoprene Type GN (GR-M) and GR-S-ST, both of which contain non-discoloring stabilizers.

Our experience with Du Pont colors in other types of synthetic elastomers has been limited, but we anticipate that equally satisfactory results can be obtained.

Through the mill

METAL DRUMS—We still need a faster return of metal drums in which neoprene latex is shipped if we are to have enough for current shipments. We cannot buy new drums unless we can prove a high return of used drums. Please help us by returning latex drums from all points east of the Mississippi River. We pay return transportation from these points and the ceiling price.

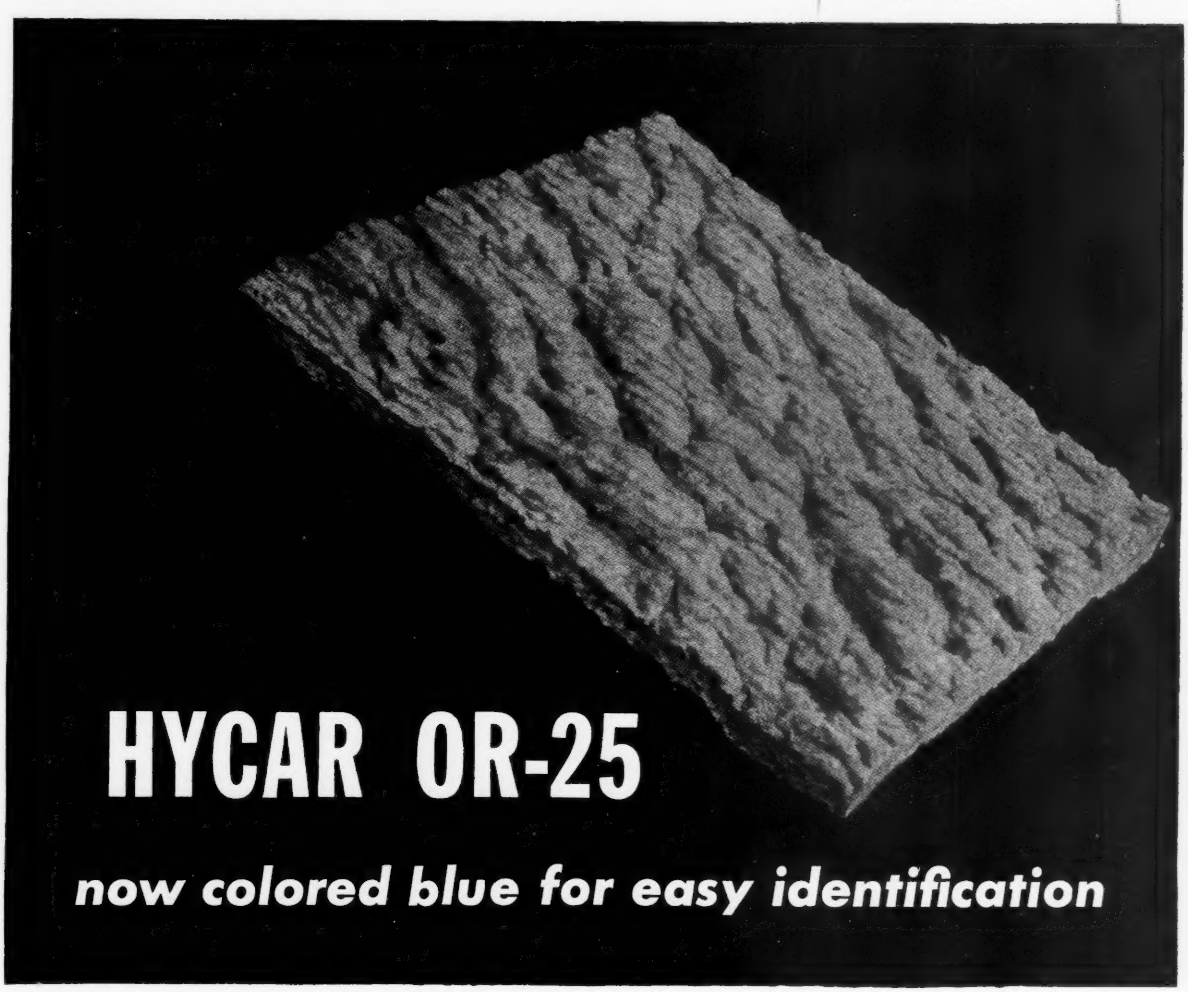
BACK THE ATTACK WITH WAR BONDS

DU PONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

INDIA RUBBER WORLD, March, 1944, Vol. 109, No. 6. Published monthly by BILL BROTHERS PUBLISHING CORP., 1309 Noble Street, Philadelphia 23, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York 16, N. Y., U.S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents.



TO assist customers in readily identifying Hycar OR-25, after it has been removed from the shipping carton, this product will be made with a pale but distinctive blue color.

This coloring of Hycar OR-25 is accomplished by adding a very small amount of methylene blue to the latex prior to coagulation and washing. The methylene blue content in the dried rubber is less than five thousandths of one percent.

Exhaustive tests on both conventional black and light colored stocks have proved that the addition of methylene blue has absolutely no effect on the excellent low temperature flexibility, oil and heat resistance and other physical properties of OR-25 compounds. In the case of light stocks, blue-tinted OR-25 actually produces cleaner, brighter white and pastel shades.

So, when you see Hycar OR-25 in the new blue tint, you will know that this innovation is a service to you to prevent any confusion in the identity of our products. *Hycar Chemical Company, 335 South Main Street, Akron 8, Ohio.*

Hycar

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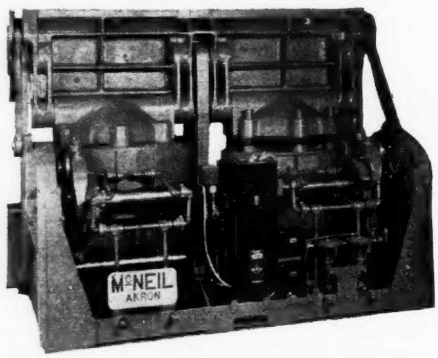

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Barco Swivel Joints are used on all kinds of hydraulic machinery, cylinders, die heads, rolls, platens, etc., under suction or pressure.

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For light colored compounds (color range 2-3)	For dark colored compounds (color range 12-14)
PICCO 10	**BUNAREX 10**
PICCO 25	**BUNAREX 25**
PICCO 100	**BUNAREX 100**

Number denotes melting point Centigrade

If intermediate colors or melting points are required for special purposes we can supply them.

These Resins are manufactured by the Pennsylvania Industrial Chemical Corporation.

Precision Chemicals for Rubber and Plastics Compounding

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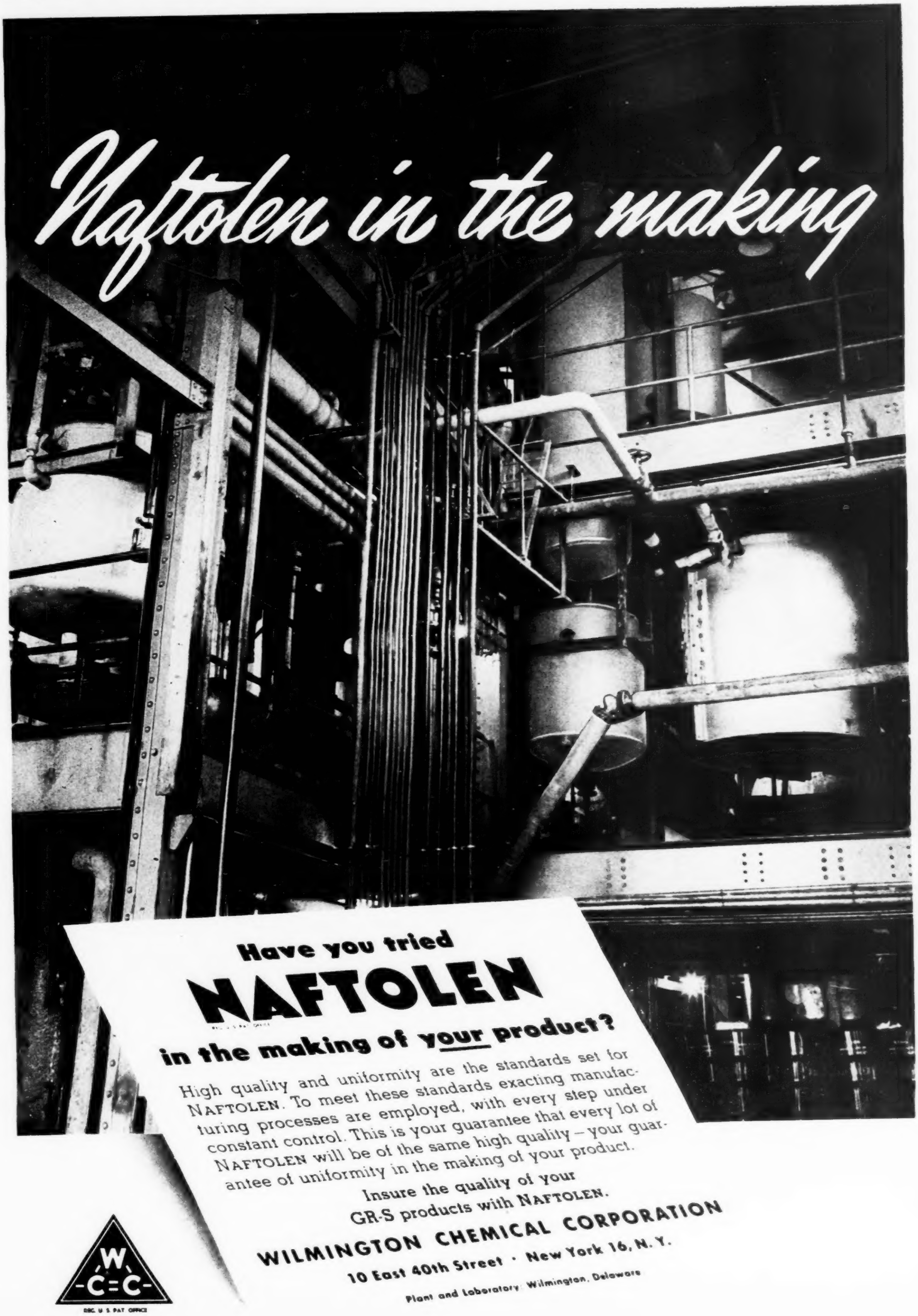
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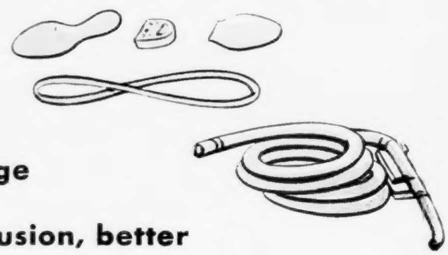
When Uniformity Is a MUST...

if

you are looking for a good reinforcing softener for GR-S soling stocks, mechanicals, and extruded stocks—or if you want lower shrinkage in molding and extrusion, better tear resistance with improved processing . . .



you will be interested to know that Barrett Coal-tar products have solved these problems for many other rubber manufacturers. These rubber compounding materials have proved themselves in many phases of rubber manufacture—natural, synthetic or reclaim. Wire or write for complete information.

SPECIFICATIONS	CARBONEX*	CARBONEX S*	CARBONEX S PLASTIC*
Specific gravity at 25°C/ 25°C . .	1.28 to 1.38	1.28 to 1.38	1.26 to 1.36
Softening point, ring and ball, in glycerine, °F	205 to 220	205 to 220	175 to 185
Insoluble in benzene % by weight	40.0 to 44.0	40.0 to 44.0	38.0 to 43.0

Note: Carbonex S and Carbonex S Plastic are modified with a small amount of available fatty acid.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
The Barrett Company, Ltd., 5551 St. Hubert St., Montreal, Que.

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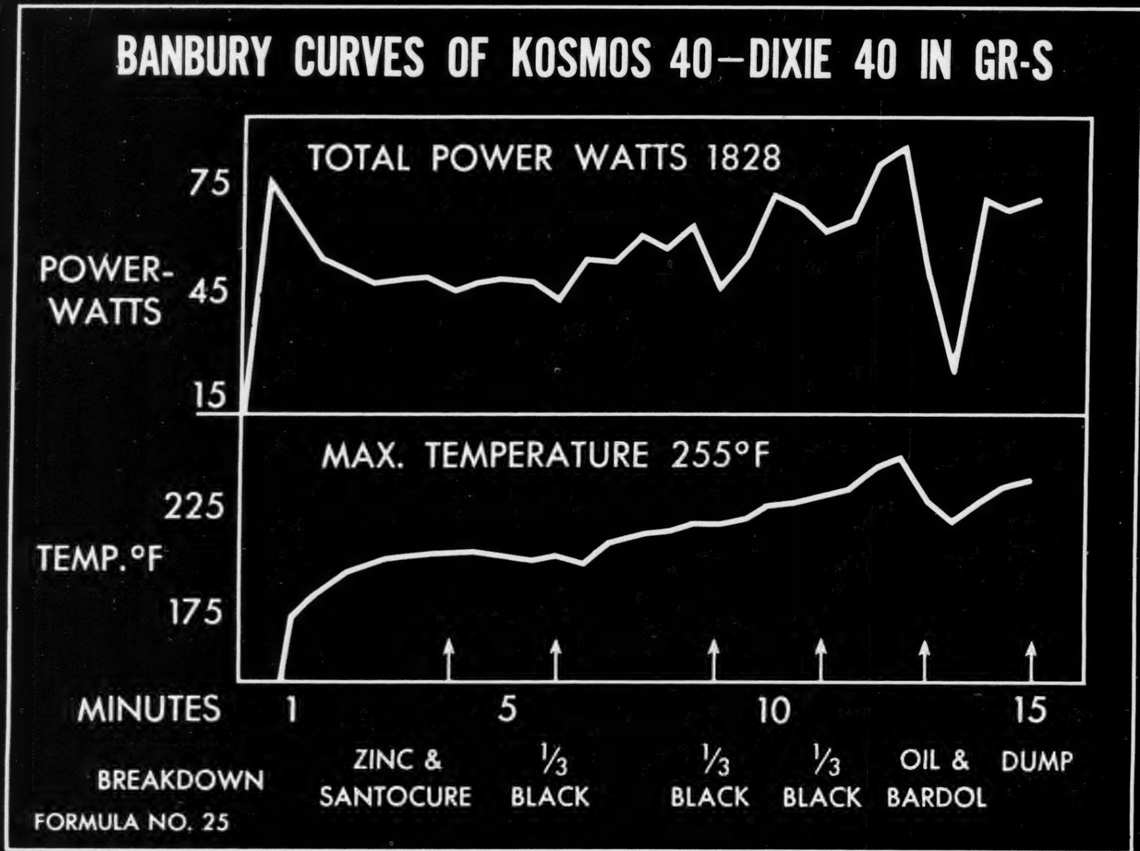


KOSMOS 40—DIXIE 40

A new furnace type reinforcing carbon black for synthetic and natural rubber produced from natural gas in special furnaces and by a special process under carefully controlled conditions and possessing a combination of most desirable characteristics;—cool mixing, easy processing, smooth and rapid extrusion, fast rate of cure, full reinforcement, low heat build up, high resiliency and high resistance to cut-growth, flex cracking and abrasion. This black is especially useful for tires of all types pneumatic or solids under any conditions, tubes, bogie wheels, footwear and mechanical goods.

RESEARCH DIVISION

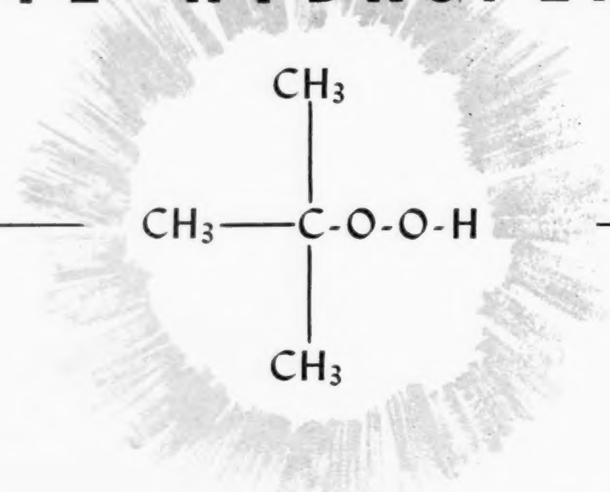
UNITED CARBON COMPANY, INC.

Charleston, West Virginia

M

Commercial

t-BUTYL HYDROPEROXIDE*



GENERAL DESCRIPTION

t-Butyl Hydroperoxide is a new, organic, alkyl peroxide which offers extremely interesting possibilities. It is standardized at a concentration of 60% (10.66% available oxygen). Use of the proper activators increases the rate of release of the oxygen.

SUGGESTED USES

1. As a catalytic agent in one or two phase polymerizations. **(t-Butyl Hydroperoxide has proved to be an excellent catalyst for polymerizing Styrene, as well as certain Elastomers such as Buna S.)**
2. As a drying accelerator in oils, paints, varnishes, etc.
3. As a combustion accelerator for heavy fuel oils used in Diesel engines.
4. As an accelerator in the curing of synthetic resins.
5. As an accelerator in the vulcanization of certain synthetic rubbers.
6. As an oxidation agent for laboratory purposes.

PROPERTIES

Molecular Weight		90
Specific Gravity	@ 25° C. (60% concentration)	0.859
Boiling Point	"	82–83° C.
Freezing Point	(60% concentration)	–30° C.
Flash Point	"	18.3° C.
Refractive Index @ 25° C.	"	1.3960
Available Oxygen	"	10.66%
Color	"	Water White
pH of 1 part 60% Conc. in 10 parts water		4
Stability	Completely stable up to	76.6° C.
Solubility:	60% concentration in water	11%
	Water in 60% concentration	5%
	In short chain aliphatics	Excellent
	In aromatics	Excellent

ACTIVATORS

Hydroquinone and other similar organic reducing agents have proved to be efficient secondary catalysts in polymerization reactions (when used in quantities up to 0.1% of t-Butyl Hydroperoxide), greatly increasing the efficiency of polymerization. When use requires quick release of oxygen, the same proportions of Hydroquinone mentioned above have proved efficient.

• • •

For experimental samples of this interesting new peroxide, write the Union Bay State Chemical Company, Peroxide Division, 50 Harvard St., Cambridge 42, Massachusetts.

*U.S. PATS. 2176407 & 2223807

UBS

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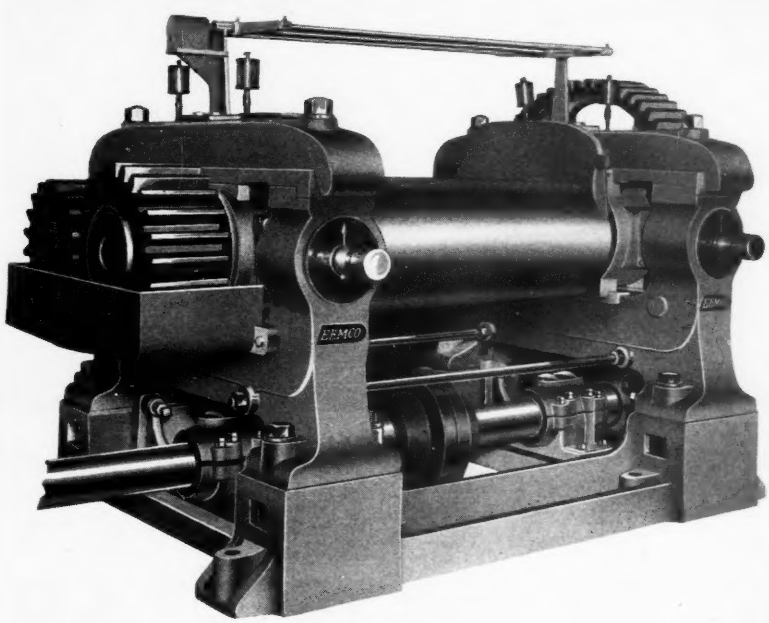
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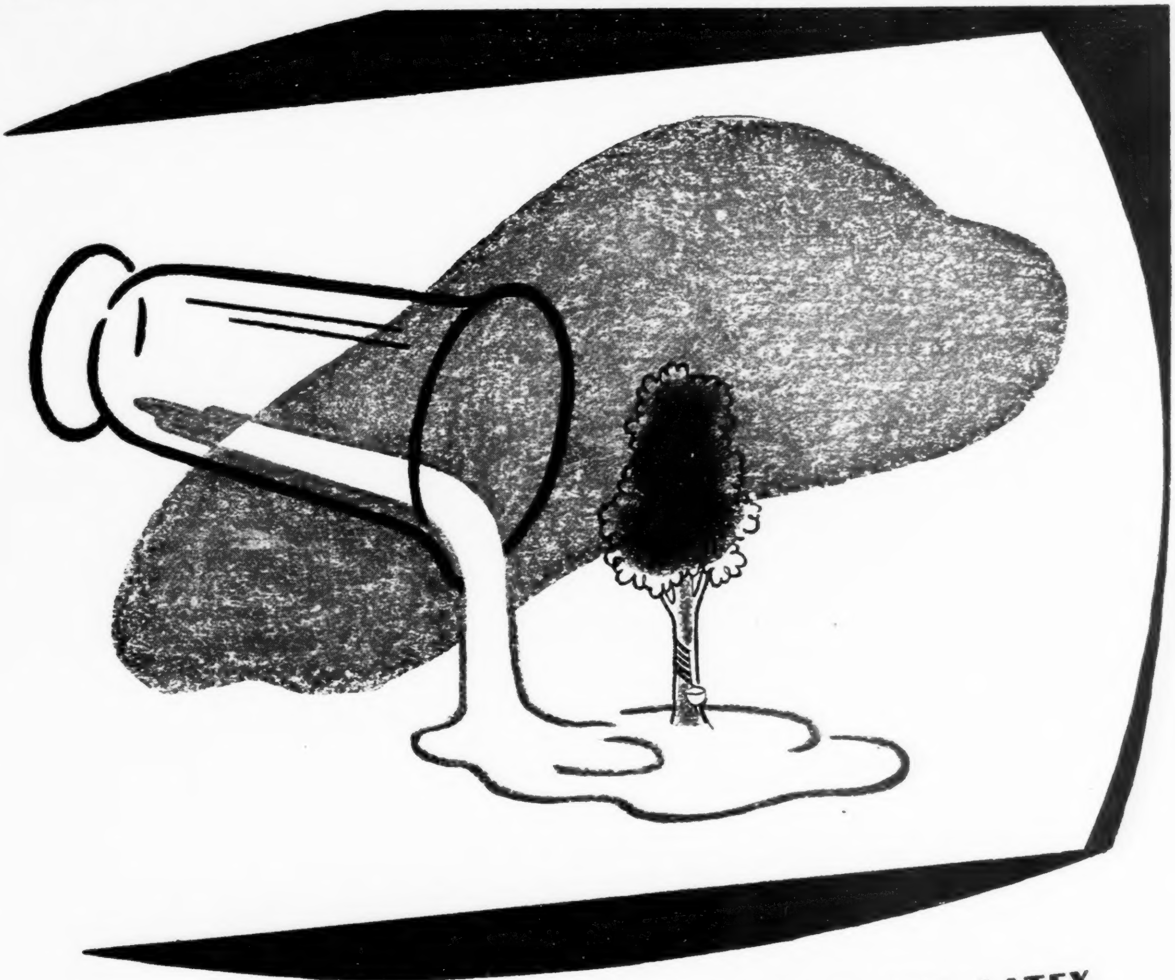

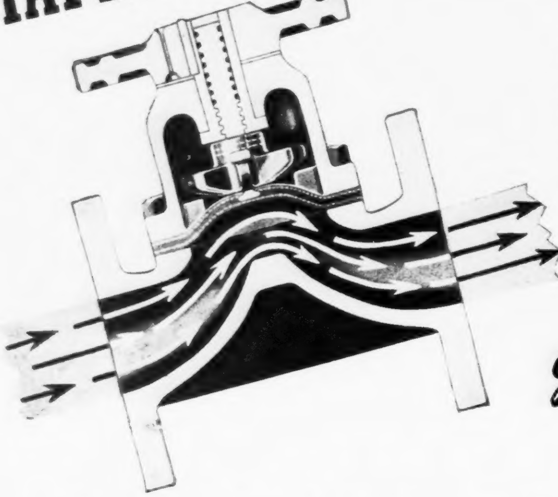


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March, 1944

Volume 109 Number 6

A Bill Brothers Publication

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

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Published monthly by Bill Brothers Publishing Corp., 1309 Noble St., Philadelphia 23, Pa. Editorial and Business Offices, 386 Fourth Ave., New York 16, N. Y. Chairman of Board and Treasurer, Raymond Bill; President and General Manager, Edward Lyman Bill; Vice Presidents, Randolph Brown, B. Brittain Wilson.

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Subscription price—United States and Mexico, $3.00 per year; all other countries, $4.00. Single copies thirty-five cents. Other Bill publications are *Premium Practice, Rug Profits, Sales Management, Soda Fountain, Grocer-Graphic,* and *Tires.*

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC
Published at 386 Fourth Avenue, New York, N. Y.

Volume 109 | New York, March, 1944 | Number 6

General-Purpose GR-S Latices

I. Development, General Properties, and Applications[1]

IT WAS not until the last half of 1943 that any appreciable amount of time was devoted to the investigation and development of GR-S latices for use as alternates or substitutes for natural *Hevea* latex. However during that period an accelerated program became necessary because of a number of factors. The Office of the Rubber Director appointed a latex subcommittee to investigate the problems plants manufacturing GR-S would encounter in supplying GR-S latices, and intensive work was carried on by Rubber Reserve Co. during this same period. Manufacturers interested in latex processes, anticipating more severe restrictions on natural *Hevea* latex because of the dwindling stockpile, increased their own efforts to develop better GR-S latices.

As a result of these combined efforts of manufacturers, synthetic rubber producers, and the technical groups involved, the Rubber Reserve Co. is now offering two types of latices differing from the latex that was originally made for GR-S production. Information on these two new types, Nos. 2 and 3, and the original No. 1 from which the standard grade of solid GR-S is regularly obtained is given below as taken from a memorandum of the Office of the Rubber Director under the date of December 8, 1943.

MEMORANDUM
To: Consumers of Liquid Latex
FROM: H. E. Simmons
Office of the Rubber Director
SUBJECT: GR-S (Buna-S) Liquid Latex

The three types of GR-S liquid latex described below are now available for shipment from several government GR-S plants.

Type No. 1

This type of GR-S latex is the one from which the standard grade of solid GR-S is regularly obtained. Type No. 1 can therefore be properly described as an emulsion of a 75:25 butadiene: styrene ratio copolymer. The properties of films deposited from Type No. 1 latex are essentially the same as the properties of regular GR-S. However, Type No. 1 films will have a higher soap content (sodium stearate) than regular GR-S. Antioxidant is present in Type No. 1 latex to the extent of approximately 1½ to 2 parts per 100 parts dry GR-S and is usually of the discoloring type. The total solids concentration is 28%-30% and this concentration is equivalent, on the average, to 2.1 pounds total dry latex solids per U. S. gallon.

Type No. 2

This type of GR-S latex is the same as Type No. 1 except that antioxidant has been omitted so that the consumer may add antioxidant if he prefers to do so.

Type No. 3

This type of GR-S latex is a 50-50 butadiene: styrene ratio copolymer emulsified on potassium rosinate and contains no antioxidant. It is available at a total solids concentration of 35% to 40%, and this concentration is equivalent, on the average, to three pounds total dry latex solids per U. S. gallon.

All three types are receiving favorable consideration as replacements for natural rubber latex in the treatment of cotton and rayon tire cord. However, Types No. 2 and No. 3 appear to be more suitable than Type No. 1 for general liquid latex applications, since Type No. 1 contains preflocculated particles.

A permit to purchase ten gallons or less of any of these GR-S latices for experimental purposes can be obtained by writing Rubber Reserve Co., Sales Department, 811 Vermont Ave., Washington 25, D. C., Attention: Mr. Richard Baybutt.

Requests to purchase quantities in excess of ten gallons must be submitted to the Office of the Rubber Director, New Municipal Center Building, Washington 25, D. C., Attention: Mr. G. B. Kayser.

Concentrated GR-S latex (e. g. 60%) is not being produced in government plants, but certain private companies with concentrating facilities may be in a position to supply experimental quantities of GR-S latex in concentrated form. The names of these concerns may be obtained by writing the Sales Department of Rubber Reserve Co., Attention: Mr. Richard Baybutt.

Some Properties of GR-S Latices

As mentioned in the above ORD memorandum, it was found that the Type No. 2 contained fewer flocculated agglomerates or coagulum than Type No. 1 and was therefore more satisfactory for general use. The film forming properties of Type No. 2 were not satisfactory for many applications, and Type No. 3, which deposits stronger films than Type No. 2, was developed. The higher styrene content and higher degree of polymerization present in Type No. 3 are thought to be the reason for its stronger film strength. In a surprisingly short time it was found

[1] Prepared by representatives of the Office of the Rubber Director and the Rubber Reserve Co. concerned with the development and use of general-purpose government synthetic latices.

that this type No. 3 GR-S latex satisfied the requirements of some of the users that were still calling for natural latex because the properties of neither neoprene latex nor reclaimed rubber dispersions were suitable for their needs.

One such requirement was for a replacement for natural latex in container sealing compounds. By the use of Type No. 3 GR-S latex it appears that no natural latex may be needed to prepare such compounds for packaging food and similar materials.

Other Uses of Type No. 3

Properly compounded Type No. 3 GR-S latex was found to be a very satisfactory material for treating paper, cloth, and other fibers in making such items as insoles, mid-soles, welting, and similar shoe products. Here it was found that the smaller particle size of the Type No. 3 synthetic latex, as compared with natural *Hevea* latex, was a distinct advantage since it impregnated the fibers more deeply and remained on the interior of the sheet, resulting in tearing strengths equal or superior to products made from natural latex. The Mullen strength of treated papers made with this GR-S latex seems to be equal to those made from *Hevea* latex. Indications are, however, that the tensile strength of the GR-S treated papers may not compare favorably with *Hevea* latex impregnated stock. There is considerable work to be done in this direction to improve this property.

A great deal of effort has been spent on Type No. 3 latex in an endeavor to use it as a replacement for *Hevea* latex in shoe adhesives. In view of the poor tensile strength of the pure gum compound and lack of pressure sensitivity or "dry tack," no great progress has been made in using it in the more exacting shoe adhesive applications. However for limited service in "wet stick" operations such as sock linings, appliques, etc., it has been found to be superior to any of the other available materials and to offer considerable advantages in price, chemical stability, aging characteristics, lack of odor, and general handling properties. Type No. 3 latex has not been successful in "dry seal" applications such as folding, lip cementing, etc., that require a pressure-sensitive, strong, high-tensile-strength adhesive.

Type No. 3 latex and its compounds were tried out for the combining of fabrics for clothing and shoe fabric use. Here it was relatively easy to obtain adequate processing properties to enable either a pickup roller or a spreader-type application to be made. In all cases it was a wet "doubling operation"; the combination had to be made while wet, since no dry combining has been accomplished with this latex because of its lack of pressure-sensitive tack. When tack is incorporated by compounding, the already low pure gum tensile strength of the film is further reduced. Combined fabrics using properly compounded GR-S Type No. 3 latex are superior to combined fabrics previously made with natural latex. The strength of the bond between the two sheets is exceptionally high, and the material has good aging properties. It might be mentioned that these good aging and processing properties were not easy to obtain because of the newness of the art of compounding synthetic rubber latices.

Dipping Application Limited

Many attempts have been made to apply GR-S latex Types No. 1, 2, and 3 in the dipping of thin-walled rubber articles. Because these latices do not have high initial pure gum tensiles it is difficult to use them in this kind of processing since the films cannot be removed from the forms without damaging the product. Progress has been made in adapting these latices to dipping processes where the films were used as coatings and were only part of the final product. Such uses would be in the rubber coating of metal parts for automotive and aircraft assemblies and of fabric gloves.

The tensile and water-resistant properties of films from GR-S latices limit their use and do not make them so satisfactory as neoprene latices and reclaimed rubber dispersions in this field.

Fiber Binding Applications

Rubber in the form of natural latex and reclaimed rubber dispersions has been used in large amounts for the binding of vegetable and animal fibers to manufacture cushioning material for war products such as crash pads, turret seat cushions, parachute backs and seat cushions, and cushions for military vehicles where there was not room for metal spring suspensions. Type No. 3 latex, when properly adjusted to give an adequate deposit on the fiber and to cure properly, presented a material that appears to be quite satisfactory. Its use in these applications is not so good as is natural latex in the resistance to fatigue or in the tensile strength of the final product. In spite of this deficiency the good aging properties, easy processing, and good general chemical stability of type No. 3 should assure its adoption here.

Prior to the wartime restrictions large quantities of natural latex were used in anchoring pile in upholstery fabrics by coating the back of the fabric with rubber which securely cemented the pile loops into the fabric backing. Compounds of GR-S Type No. 3 latex have been found to be satisfactory for this use and to offer as strong a bond as is required. Aging characteristics are equal or superior to the natural latex compounds previously used.

The Treatment of Tire Cords

Much attention is being paid to the use of GR-S Types Nos. 1 and 2 latex for the treatment of tire cords and tire fabrics. It is the general consensus of opinion that either Type No. 1 or 2 latex would be more acceptable than the Type No. 3 latex in view of the fact that the polymer in the former would be of the same composition as the GR-S used in tires. Type No. 3 latex with its higher styrene content might offer some complicating factors, including possibly higher hysteresis. Both materials are being tested, however, in order that no stone be left unturned in the effort to produce the most satisfactory synthetic rubber tire that can be made.

General Considerations and Conclusions

There are certain very definite advantages in GR-S latices, and one of the most important is the absence of protein stabilizers, which makes these latices relatively free from putrefaction and the accompanying objectionable odors. The odor of GR-S latices is currently aromatic because of a very slightly amount of residual uncombined styrene monomer. This freedom from putrefaction and objectionable odor is an extremely important asset not only in such things as container sealing compounds, but in most other liquid latex applications where, in many products, odor is a serious problem.

It has been interesting to note that a great deal more difficulty was anticipated in handling GR-S latices than actually occurred. Much emphasis was placed on the fact that GR-S latices might be more corrosive than natural latices and that equipment, packages, tank cars, etc., might have to be coated to protect them from this action. Actually in most cases these current GR-S latices do not seem to cause any more difficulty than was experienced with the natural product. Also, attention had to be paid to the effects of these latices on the people handling them. To date no trouble has been experienced on this account.

and no difficulty is expected. The freedom from ammonia offers a decided advantage in favor of the GR-S latices since ammonia is not only objectionable to many people, but it has a distinct allergic effect on others.

In the course of handling GR-S latices during winter months it was found that gelling occurred at somewhat higher temperatures than with natural latex. Fortunately the gell seems to be reversible in most cases, and ordinary storage at room temperature for a few days brings the material back to its original condition.

II. Specific Properties, Compounding, and Processing

L. H. Howland,[2] C. R. Peaker,[2] and A. W. Holmberg[2]

In view of the present shortage of natural rubber latex and the prospect of greater availability of synthetic rubber latices of the butadiene-styrene copolymer type, this paper is being offered at this time to indicate some of the specific properties of these latices, and methods of compounding and handling, as a guide to prospective users. It must be remembered that much of the information is of a preliminary nature and may have to be revised in the light of new research and availability of new and better polymers.

Preparation of Synthetic Rubber Latices

As is now well known, synthetic rubber latices are obtained as an intermediate step in the manufacture of GR-S polymer because this polymer is prepared by emulsion polymerization. Emulsion polymerization is carried out essentially by emulsifying the appropriate hydrocarbons, such as butadiene and styrene, in an aqueous soap solution and heating the emulsion so formed at an elevated temperature for periods of 12 to 24 hours to induce and carry on copolymerization of the hydrocarbons.

At the end of the reaction period a latex-like emulsion is obtained which contains some free hydrocarbons. When the end-product desired is the dry polymer, it is customary to stop the polymerization reaction before completion of the copolymerization, by adding a "short-stopper," i.e., a material capable of arresting the polymerization reaction. The latex is then subjected to reduced pressure to remove unreacted butadiene, and to steam distillation under vacuum to remove residual styrene. The latex is pumped to large storage tanks where an antioxidant in the form of an emulsion or dispersion may be added. Since from a latex user's viewpoint we are not interested in the preparation of dry polymer, the remainder of the process will not be described here.

Available GR-S-Type Latices

In Table 1 are shown the composition[3] and properties of the three standard types of synthetic rubber latices available at the present time.

TABLE 1. AVAILABLE GR-S- TYPE LATICES

Type No.	1	2	3
Formulae:			
Butadiene	75	75	50
Styrene	25	25	50
Treatment after Polymerization:			
Short Stopper	0.1	0.1	0.0
Antioxidant	1.5	0.0	0.0
Properties:			
Polymer viscosity (Mooney)	45-55	45-55	65-85
Total dry solids (%)	24-28	24-28	35-40
pH	8.5-10.5	8.5-10.5	9.5-11.5
Viscosity (cps)	5-10	5-10	8-10
Yield value (cgs/cm²)	0.5-1.0	0.5-1.0	1.0-1.5
Surface tension (dynes/cm)	57-61	57-61	45-57
Stability (minutes)	30+	30+	30+

Type No. 1 latex is the latex from which the standard GR-S polymer (75/25 butadiene-styrene) is prepared. It contains a reaction stopper, and 1½ parts of the antioxidant. The total solids content is quite low. Type No. 2 GR-S latex is the same as Type No. 1 GR-S latex, except that the antioxidant has been omitted. This latex (or Type 3, described below) should be used where it may be desirable to use special antioxidants, as for minimum staining, discoloration, etc. Both Type No. 1 and Type No. 2 GR-S latices are dispersed with commercial soaps, consisting chiefly of sodium stearate.

Type No. 3 GR-S latex is quite different from the other two. The polymer contains a higher proportion of styrene (50-50 butadiene-styrene) for increased cured tensile strength, and it is dispersed on the potassium soap of crude wood rosin, which results in some improvement in tack and adhesive properties. In addition the latex is comparable in total solids content to normal natural rubber latex. It will be noted that it contains no reaction stopper (because the reaction has been carried nearly to completion) and no antioxidant.

In regard to the properties shown in Table 1, the polymer viscosity refers to that obtained on the dry polymer with the Mooney plastometer. The viscosity of the polymer from Type No. 3 GR-S latex is likely to be more variable than that from Types Nos. 1 and 2 because the reaction is carried more nearly to completion; also, these high conversions are used to attain the desired total solids content, and the batches are finished on the basis of solids content rather than polymer viscosity. It is not known whether polymer viscosity is important from the latex user's viewpoint, but it has been assumed that the higher viscosities would be more desirable since they approach those of natural latex rubber. Further research is indicated along this line.

It will also be noted that in spite of the relatively high amounts of soap used in the preparation of these latices, the surface tensions are much higher than those of natural rubber latices. This condition is due to the fact that the GR-S particles expose an enormous surface compared to those of natural rubber latex (their diameter is $\frac{1}{10}$ or less than that of natural latex particles),[4] and hence most of the dispersing agent present is adsorbed and not available for lowering surface tension. For some applications where "webbing" is undesirable, the high surface tension may be advantageous; but in using such latices for applications in which wetting or impregnation are important, this must be borne in mind, and additional amounts of wetting agents added.

Another point about the table worth mentioning is in regard to the figures given for stability. These were determined by the high-speed stirring method used for natural latex. They indicate very high stabilities by this test; yet all these latices are very sensitive to mechanical pressure and coagulate with even light hand-rubbing. Research is at present under way in several laboratories on other methods of measuring stability.

[2] Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

[3] ORD memo—12-8-43.

[4] See, for example, electron photomicrographs in an article by M. Von Ardenne and D. Beischer, *Rubber Chem. Tech.*, 14-17, 18 (1941).

Compounding Techniques

VULCANIZATION. Butadiene-styrene copolymers are noticeably slower in rate of vulcanization than natural rubber; thus more acceleration is required to produce a comparable cure for a given time and temperature. Since many latex applications call for vulcanization at temperatures of 100° C., the data presented are confined to this temperature. It is, of course, obvious that if higher temperatures are permissible, the amount of acceleration can and should be reduced. The most satisfactory accelerators for general latex work are the dithiocarbamates (such as Methazate, Ethazate, Butazate, etc.), or the thiurams (Monex), or combinations of these with thiazoles (e.g., Butazate with M-B-T or OXAF). For evaluation purposes a composite paste comprising the following may be used:

Sulphur	2.0
Zinc oxide	3.0
OXAF	1.5
Butazate	0.5

This combination produces good cures in gum stocks and most loaded stocks in from 30-60 minutes at 100° C. in circulating air. The OXAF may be omitted from the formula if the Butazate or its equivalent is raised to about 1%.

For most purposes the use of two parts of sulphur is suggested to produce well-cured vulcanizates. In combination with natural rubber latex it appears that even higher sulphur ratios and more acceleration are desirable in order to equalize the rates of vulcanization of the natural and synthetic rubber. Table 3 and Figure 3, which are discussed further along in this report, give more data on this matter. Dithiocarbamate accelerators cause synthetic latices to precure in the latex state, just as they do when present in natural latex. This precure should not be allowed to proceed too far as it will result in reduced tensile strength and elongation. Where possible, it is desirable to mix only enough compound with accelerator for use over a relatively short period of time; or if larger quantities must be handled, to adopt some cycle by which freshly prepared compound is added at regular intervals.

The amount of zinc oxide used does not appear to be critical. Where transparency is desirable, the amount may be limited to under 1% while for general purposes 2-3% may be used.

The same methods of vulcanization used for natural latex may be used with synthetic latices; that is, vulcanization may be carried out in air, water, steam, ammonia, etc., provided a proper balance of curing ingredients is worked out.

STABILIZERS AND WETTING AGENTS. The commonly used stabilizers and wetting agents, such as casein, glue, sulphated alcohols, sulphonated products, etc., may be used with GR-S latices, to impart stability against mechanical working, as in spreading or against chemical destabilizers, and to improve the wetting qualities of the latices.

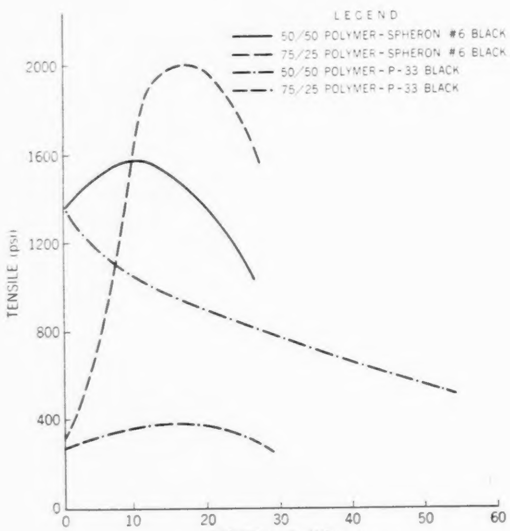


Fig. 1. Effect of Carbon Blacks on GR-S Latex Film

Where wetting agents are to be added, it will be found usually that more will be required than with natural latex to accomplish the desired results. This follows from the greater surface, and hence adsorptive capacity, of the very small GR-S latex particles.

FILLERS. The behavior of fillers in GR-S latices is very interesting. It is a well-known fact that fillers in natural rubber latex are merely diluents and reduce tensile strength and elongation in proportion to the amount added. In GR-S latices this is not always the case. Certain fillers in GR-S latex behave like fillers in dry polymer and show a certain amount of reenforcement. This is shown by the data in Table 2 and Figures 1 and 2.

As is shown in the table and Figures 1 and 2, fillers like whiting, zinc oxide, and titanium dioxide decrease the tensile strength. On the other hand carbon black gives a very marked increase; while clay produces a small improvement with the 75/25 butadiene-styrene polymer; the improvement from using carbon black is not so pronounced with the 50/50 polymer, but considerable loading is possible without sacrifice of tensile strength or other properties (except set).

TABLE 2. FILLERS IN GR-S-TYPE LATICES

Polymer	100	(Vulcanization temp. 100° C.)
OXAF	1.5	
Sulphur	2.0	
Zinc oxide	3.0	
Butazate	0.5	

Filler	Parts/100 Polymer		Types Nos. 1 and 2*				Type No. 3*			
	By Weight	By Volume	300% P.S.I.	Tens.	El.	Set	300% P.S.I.	Tens.	El.	Set
Spheron 6 Carbon Black	0	0	215	282	248	—	229	1322	681	10
	10	5.5	339	769	509	9	214	1490	733	—
	20	11.1	480	1823	627	19	376	1605	645	40
	30	16.7	495	2005	602	32	386	1227	632	50
	50	27.7	566	1500	623	48	500	1050	610	50
Suprex Clay	0	0	197	399	460	13				
	10	3.7	313	484	429	13				
	25	9.3	348	649	476	21				
	50	18.5	475	826	589	41				
	100	37	644	740	340	34				
Keystone Whiting	0	0.0					164	1140	786	13
	5	1.9					255	1358	772	18
	10	3.7					279	1118	782	13
	25	9.3					203	974	796	13
	50	18.5					203	733	830	28
	100	37.0					272	440	831	40
P-33 Black†	0	0.0	215	282	248	—	448	1332	590	10
	5	2.8					461	1220	530	7
	10	5.6	—	302	281	7	529	862	428	7
	20	11.1	325	364	200	10				
	25	13.9					681	970	424	13
	30	16.7	333	392	205	—				
	50	27.8	—	304	123	—	679	831	411	20
	100	55.5					578	641	260	15
Titanox A	0	0.0					120	1270	688	13
	5	1.3					127	942	665	15
	10	2.6					308	1241	765	18
	25	6.4					386	1070	728	23
	50	12.8					726	814	616	33
Zinc Oxide XX 272	0	0.0					305	1532	731	10
	5	0.9					312	1289	730	10
	10	1.8					339	1170	708	13
	25	4.5					394	919	646	13
	50	9.0					455	834	626	18
	100	17.9					542	657	560	13

* Set measured at break.
† Cures for Type No. 3 latex at 110° C.

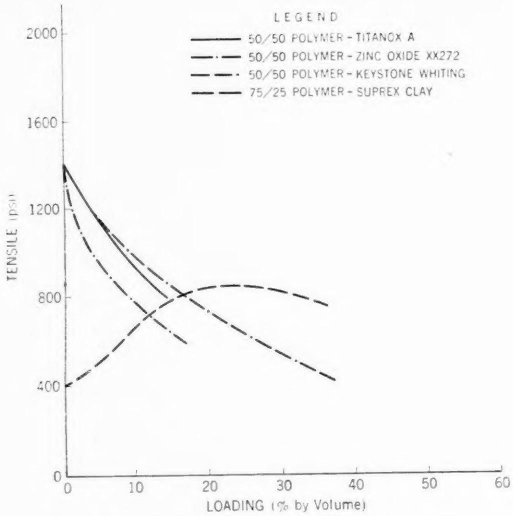


Fig. 2. Effect of Other Fillers on GR-S Latex Film

Handling and Processing

There are certain properties of GR-S-type latices which should be discussed as they govern subsequent processing of the latex compound.

Drying. Synthetic rubber latices dry more slowly than natural latex. In addition they are more sensitive to drying conditions. Best results were obtained when the lowest practical drying temperatures were used (e.g., 50° C. or lower), for drying sheet or dipped goods. The tendency toward blistering during drying at elevated temperatures is very pronounced. The wet strength of the drying gel is very low so that any distortions from blistering, shrinkage, etc., tend to cause the film to crack. Unless the compound is badly precured, these cracks appear only on the surface, but they do result in unsightly, weakened articles. Where it is possible, it has been found that increasing the compound viscosity by the use of thickeners aided in reducing or eliminating surface cracking. Fillers are also useful in aiding drying and in preventing cracking.

Coagulation. GR-S-type latices can be coagulated by acids, salts, etc., similarly to natural latex. However it is difficult to make all rubber dipped articles from them because the coagulated film is very weak and liable to tear or crack. Since the tear resistance of the cured film is also low, it is difficult to remove the article from the dipping form unless great care is used, the more so because adhesion to the dipping form is greater with the synthetic latices than with natural latex.

The low uncured strength of these polymers presents quite a problem when equipment is to be cleaned. Dried natural latex can be stripped quite easily, but dried synthetic latex is of such low strength that this easy stripping is not possible; hence it is desirable to clean equipment immediately after use, by washing with water, rather than allowing the latex to dry.

It should also be pointed out that synthetic latices, like natural latex, are liable to freezing in cold weather unless proper precautions are taken. It has been found that some of these latices appear to gel below about 40° F., but they can be liquefied on warming to higher temperatures.

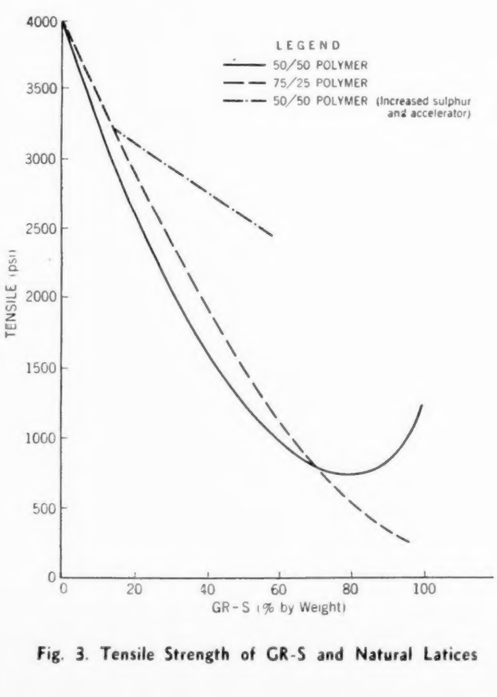


Fig. 3. Tensile Strength of GR-S and Natural Latices

Mixtures of GR-S-Type Latices with Natural Latex

Figure 3 and Table 3 show some data for blends of synthetic latex and natural latex. The indications are that intermediate properties are obtained depending on the proportions used; the data also indicate that much better results are obtained from blends as regards tensile strength by increasing the sulphur and accelerator percentages. This is apparently due to an improved balance in the rates of cure of the natural and synthetic rubbers. Such high accelerator and sulphur ratios are generally undesirable for natural latex because the pronounced overcures obtained reduce the physical properties.

Table 3. Mixtures of GR-S Latices and Natural Latex

Rubber hydrocarbon	100.	Creamed natural latex or GR-S Type No. 3 containing a small amount of KOH—1 pt.
ZnO	3.	
OXAF	1.5	
Sulphur	variable	
Butazate	variable	

% Synthetic	S	Butazate	Type 1 300%	Type 1 Tens.	Type 1 El.	Type 1 Set	Type 3 300%	Type 3 Tens.	Type 3 El.	Type 3 Set
0	2	0.5	202	3940	1040	10	202	3940	1040	10
10			125	3560	975	10	124	3188	1011	10
20			167	3540	996	10	147	2873	989	10
40			166	1940	878	10	142	1640	875	5
60							145	1030	867	5
80			159	516	708	5	75	740	860	8
100			156	244	546	10	85	1300	887	10
20	3	1.0					165	3160	758	10
20	3	2.0					406	3637	686	10
40	3	1.0					209	2830	735	10
50	3	1.0					245	2540	697	10

Summary and Conclusions

For most uses in which it is desired to replace natural rubber latex with a synthetic latex it has been found necessary to provide a GR-S latex having a different ratio of butadiene to styrene in order to have a deposited film with improved tack and tensile strength. This latex is known as GR-S Type 3 and contains essentially 50 parts of butadiene and 50 parts of styrene emulsified in a water solution of the potassium soap of crude wood rosin and in which the polymerization of the monomers has been carried practically to completion.

Butadiene-styrene copolymers are slower curing than natural rubber. More acceleration and the higher sulphur content found generally desirable for curing the bulk rubber are required with the latices. Fillers, particularly carbon blacks, in GR-S latices have the unusual effect of

(Continued on page 584)

Ordnance Keeps 'Em Rolling—II[1]

What Fleet Men May Learn from Army Tests of Synthetic Tires

Lt. Col. B. J. Lemon[2]
and Capt. J. J. Robson[2]

Fig. 1. 7.50-20 90% Synthetic Tires Tested at Camp Seeley; Course, 10% Gravel; Load, 2,700 Pounds; Mileage, Approximately 2,000

THE first step in this work, as already described, was the development of synthetic tread tires, with natural rubber carcasses. These tires used about 40% synthetic and about 60% natural crude rubber. Because of the critical situation in the crude rubber supply, it was apparent that synthetic carcasses must also be developed in order that crude rubber consumption be reduced to an absolute minimum.

Synthetic Rubber in the Tire Carcass

The first of these synthetic carcass tires we produced had overall synthetic contents of from 90 to 100%. The first group of 7.50-20-size tires of this composition run at Camp Seeley is shown in Figure 1. Very low mileage was experienced, and practically all tires blew out from heat failures and from separation of treads from carcasses at a few thousand miles. At the Normoyle test course this same heat and separation problem was experienced, as indicated in Figure 2. These results manifested the higher running temperature of synthetic rubber, which causes excessive heat build-up and blowout. Laboratory test data compiled by one of the tire companies show this situation graphically in Figure 3.

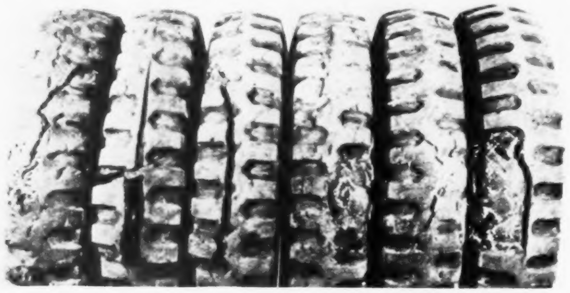


Fig. 2. 9.00-20 100% Synthetic Tires Tested at Normoyle; Course, 70% Highway, 15% Gravel, 15% Cross Country; Load, 3,650 Pounds

At Normoyle also the problem of reduced ability of synthetic carcass tires to withstand the bruise or shock breaks which are encountered in military cross-country operations became apparent. It was found that in some cases twice as many failures occurred in the synthetic carcass tires due to bruises when tires strike rocks or other obstructions. Such failures are the principal cause of premature tire removal in Army service and therefore immediately constituted a major problem.

This established two new problems to be overcome in the use of synthetic rubber: (a.) heat-type failures, which

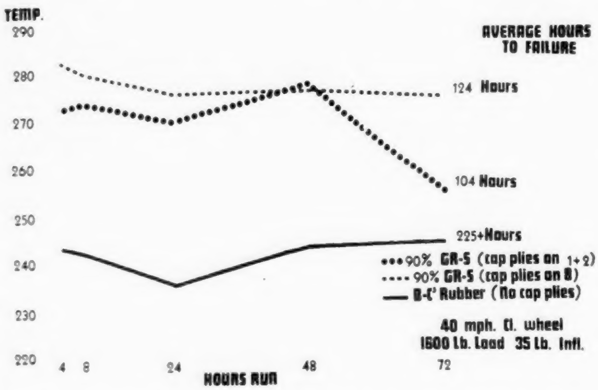


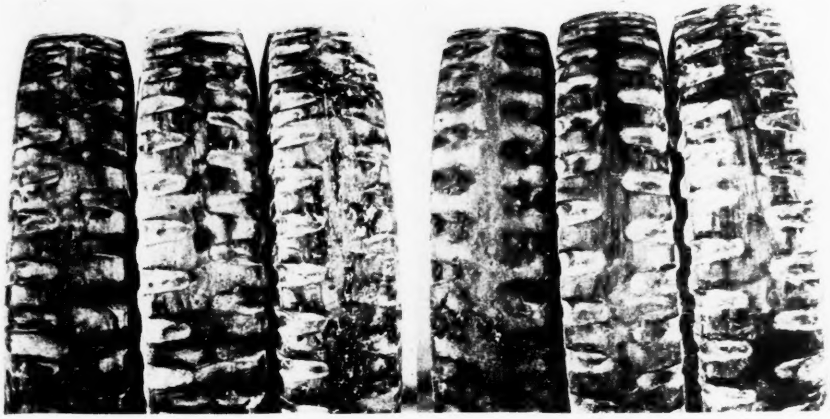
Fig. 3. Running Temperatures, 90% GR-S *vs.* B-C[3] Rubber, 7.50-20/8 Mastergrip Tires (Average Two Tires)

are experienced in long-haul supply type operations and (b.) bruise or shock breaks in the carcass due to striking rocks or other obstructions in cross-country tactical-type operations.

An extensive series of development programs have been directed at heat failures, and very effective results have been obtained. It was found that placing the slight amount of allowable natural rubber in the breaker region and last plies, which is the part developing the highest temperature, helps to resist heat. The industry chemists have made important contributions by working out new compounds which run at lower temperatures and resist heat failures.

Special measures have been taken to resist bruise blowouts. The first of these is the use of extra reenforcing plies extending across the crown of the tire, known as "cap plies." These "cap plies", which any company can adopt, are essentially two extra breakers across the crown to improve resistance to shock and bruise-type failures. The construction is used in the great volume 7.50-20 and 9.00-16 tires, with cotton cord, as well as in the 7.00 10-ply and 7.50-16 sizes. In the 8.25, 9.00, and 10.00 sizes of truck tires using 10 plies or more, rayon cord is now specified by the Ordnance Department, where synthetic

[1] Presented before the 1944 annual meeting of the Society of Automotive Engineers, Detroit, Mich., Jan. 10, 1944. All photographs through the courtesy of Ordnance Test Command, U. S. Army.
[2] Development Branch, U. S. Army Ordnance, Detroit, Mich.
[3] WPB Compound B, Tread, Compound C, Carcass.



Natural — Synthetic

10,117 Miles Diagonal Break | 15,092 Miles Cross Break | 16,502 Miles | 7,034 Miles Cross Break | 16,502 Miles | 16,351 Miles

Fig. 4. Natural Rubber *vs.* 90% Synthetic Rubber, 7.50-20 Tire Tested at Normoyle

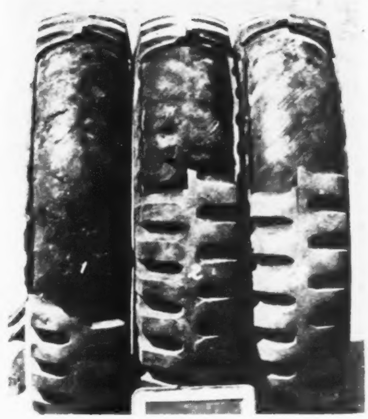


Fig. 5. 7.50-20 100% Synthetic Tires Tested at Camp Seeley, after 1,037 Miles

rubber is used in the carcasses. This results in a thinner carcass, which reduces running temperatures and resists heat failures, and at the same time provides a stronger cord which resists bruise or shock breaks to a higher degree.

These constructional features and better compounds have given us sufficient improvement so that synthetic tread and carcass tires will provide mileage closely comparable to natural rubber tires in normal military service.

A typical group of late 90% synthetic tires compared with natural rubber tires of the same make is pictured in Figure 4. The synthetic tire shows slightly more chipping, but only one tire has failed from bruise; whereas two of the natural rubber tires are out of service. None have heat failures. This is a severe test, and those of you who know our Normoyle course will agree that synthetic tires which will give this kind of service are going to stand up.

All our medium-size tires are now being produced with synthetic treads and carcasses. Ninety per cent. overall synthetic is used in the large volume 7.00 10-ply through 9.00 sizes and 70% overall synthetic in the 10.00 size. This will mean millions of synthetic Army tires in 1944.

Tread wear has been measured in all these tests, but has not been a major factor because of the more pressing problem of improving resistance to premature failure. Our figures show that synthetic treads have as good wear as the war-quality natural and reclaim rubber treads and are in many cases superior for wear.

Before leaving this group of tires it should be explained that 90% synthetic is the highest amount contemplated for use in these sizes, at least in the near future. A recent test is shown in Figure 5 on some 100% synthetic tires, all of which failed at 1,037 miles. These results indicate that the 10% or more of crude rubber is necessary to give adequate service in truck tires.

Tests on Large Tires

The largest tires, sizes 11.00 through 14.00, represent the most severe problem, since they are thicker and heavier and are considerably overloaded on some Army and Transportation Corps vehicles. Test programs are in progress which show favorable results, but which are not sufficiently conclusive to indicate the final constructions the Army will use. This includes tests of large earthmover tires, up to 21.00-24 size, used by the Army Corps of Engineers.

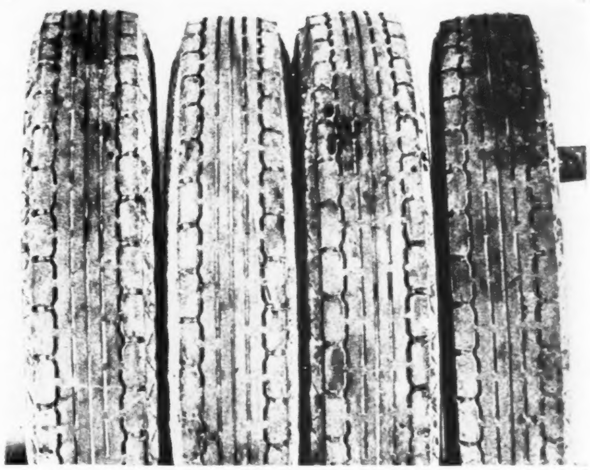


Fig. 6. Tires Recapped with Buna S Camelback after 16,974 Miles on Normoyle Test Course

This large-tire-size group is not of general interest to fleet owners, since few road vehicles use such sizes, and their volume in Army requirements is small compared to the previous groups. Accordingly no detailed discussion will be made of this group.

Synthetic Rubber Inner Tubes

At first the work on synthetic tubes was discouraging. Early samples split along the tire bead line, separated at the splice, pulled away at the valve patch, and chafed when used in drop center rims or with beadlocks.

A separate committee of tube technicians was set up, and special test trucks were provided so that tube failures could be segregated from casing failures. Tubes of GR-S synthetic were worked out which, when applied to rims with flaps, resulted in an average mileage of 17,000 and have been run to 30,000 miles without failure.

Tubes made of GR-I, Butyl synthetic rubber, were found to present no such major problems as GR-S, and averages of better than 20,000 miles were obtained with Butyl tubes.

At present the Army is accepting military tubes of GR-S synthetic in sizes 6.00 through 9.00 for all wheel diameters when applied on rims using flaps.

Although the synthetic rubber tubes are not so good as the natural rubber tubes, it is evident that with reasonable care on application and keeping inflation up to standard, and also keeping within the specified speed limit, they will give satisfactory service.

Repair and Recapping

A problem concurrent with the production of an adequate military synthetic tire and tube is that of recapping and repairing. As a direct result of the Ordnance-Industry development program, all camelback used to recap the bulk of the Army and civilian tires is almost 100% converted from the use of natural rubber. The compounds now containing 50-65% GR-S plus reclaimed rubber, and tires recapped with this compound are doing a good job, as indicated in Figure 6, which pictures results after 17,000 miles of operation.

Repairing with synthetic is a tougher problem than recapping and has reached a stage where repair materials now use a blend which includes 25% synthetic rubber.

Repairing of synthetic tubes has presented a tricky problem. Ordinary hot or cold patches which are standard in the field have not been fully effective on synthetics to date. To repair a synthetic tube properly, it is recommended that a professional repair on a hot plate be made. The heat should be confined to within the temperature range of 285° to 310° F. When a repaired synthetic tube is subjected to higher heat, the repair quickly begins to crack at the joint and continues to crack until there is a leak at the edge of the repair. On the low temperature side, adhesion is not satisfactory below 285° F.

Synthetic tubes are more sluggish and less elastic than those made from natural rubber. Therefore in repairing synthetic tubes with natural rubber, or with a blend of rubber and synthetic, the vulcanized repair gum should have as near as possible the same modulus of elasticity as the tube itself. For example, ordinary rubber tube repair gum is not so good as tread repair gum because the latter is stiffer and has more nearly the same elasticity characteristics as a synthetic tube. Rapid improvement has been made in compounding and repairing of synthetic tubes so that the service received from repaired tubes is fast becoming satisfactory.

Conclusions

From these data and this discussion you will see that a great amount of development has been done on synthetic rubber. The question is: What can fleet operators learn from this work?

The first thing is that certain fundamental problems which originally appeared extremely difficult have now been solved through intensive Ordnance-Industry development. If some of your first tires do not live up to expectations, do not jump to the conclusion that synthetic tires are fundamentally bad. If Ordnance had quit because its first synthetic tires were unsatisfactory, neither you nor the Army would have sufficient tires today because our precious crude rubber would have been farther expended, and synthetic tires would not be in production.

The second thing is that synthetic tires to do a good job must be properly used. For most types of trucking they will give adequate service. There is one class of service where they may give trouble—the long, sustained high-speed intercity runs during hot summer months. Under these conditions synthetic tires will not stand abuse. The effect of overload of synthetic tires is of major importance. As an example, tires on a recent test averaged 4,954 miles at 20% overload. The same tires at 10% underload were all still running at 10,000 miles. These were run on long hot runs similar to the most severe trucking operations. This tendency becomes more critical at the higher overload. Synthetic tires will not stand abuse by severe overloading, and this point will be forcefully driven home to some operators by epidemics of heat blowouts. The remedy is to get sufficient tire capacity on trucks to carry the load, and to give them the best of maintenance.

The third thing we feel that can be learned, and which is perhaps the most important, is that the Army has every confidence in synthetic tires. This confidence is based on factual data from severe tests, plus the experience of hundreds of thousands of tires in service extended well over a year. Understand clearly that we do not claim synthetic tires are equal to natural rubber tires, because they definitely are not so good. The gap between the two is steadily decreasing, however, and the tire industry is making a tremendous effort to eliminate this difference completely. We hope, however, the fact that the Army is so thoroughly sold on synthetic tires will give fleet operators and truck engineers confidence and help to dispel some of the doubts that have been expressed.

The Ordnance Department wishes to take this opportunity to express again appreciation to the entire rubber industry for the splendid cooperation it has manifested in this vital activity. Competitive considerations have been completely abandoned, and all companies, large and small, have pooled their technical resources to put the Army on synthetic rubber. We believe that when the history of this war is written, no industry will show more effective results than the rubber industry has accomplished in this Ordnance synthetic tire development.

Geon Polyvinyl Resins

A group of unique polyvinyl resins is now being offered to industrial users under the name of Geon resins. Two of the resins, Geon 202 and 203, are entirely new vinyl chloride: vinylidene chloride copolymers, different from any others previously developed in this group. The Geon 100 series are special vinyl chloride polymers characterized by their thermal and light stability, toughness, and chemical inertness. Geon 101 was developed especially for electrical applications, such as wire and cable insulation, while Geon 102 is adaptable to general services. The new Geon 200 series was created to meet the need of polyvinyls which combine increased solubility and thermoplasticity with exceptional stability, chemical resistance, and wide useful temperature range. Their resistance to hydrolysis by boiling water or even hot alkali is outstanding in the field of vinyl chloride polymers. The resins are supplied either in powder form or in the ready-to-use form, as granules or sheet. The B. F. Goodrich Co., Akron, O.

GR-S Latices

(Continued from page 581)

producing reenforcement in contrast to their effect in natural rubber latex where they act only as dilutents. Drying temperatures must be very low with synthetic latex films because of the low strength of the wet film.

Synthetic latices mix readily with natural latex and the properties of the resultant films are generally intermediate depending on the proportions used.

Abstracts of Technical Data in the Field of Synthetic Rubber Seized by the Alien Property Custodian—I

Frederick W. Breuer[1]

TECHNICAL data in the field of synthetic rubber which were made available by the Alien Property Custodian have been classified and abstracted by the Office of Rubber Director[2] and have been given limited distribution. Since the Alien Property Custodian has vested all the material cited, and since it is the Custodian's policy to make the patents and related material vested by him available to the American people, both to aid in the successful prosecution of the war and to help build a sound postwar economy, he has authorized publication of this report so that it will receive as wide circulation as possible among those interested in synthetic rubber and its components. The abstracts which follow have been taken from four different categories of material which the Alien Property Custodian has vested as follows:

(1) Issued United States Patents, formerly owned by or assigned to enemy aliens or residents of enemy-occupied territory, or to individual organizations acting as fronts for enemy interests. The majority of such patents have been vested, but since all of them are on record, abstracts of these patents are not included in this report.

(2) Pending Patent Applications, filed with the U. S. Patent Office, of enemy aliens, residents of enemy-occupied territory, or enemy interests to which these applications have been assigned. These applications have been vested and are being prosecuted by the Alien Property Custodian. Specifications, but not claims, have been printed of most of these applications except those on which patents have been allowed and a limited number of cases which have been placed under secrecy orders. Copies of printed specifications may be obtained for 10¢ each from the Commissioner of Patents, Washington, D. C., or they may be inspected in the Alien Property Custodian's patent libraries in Washington, Chicago, New York, Boston, and Portland, Ore. Copies of vested U. S. patents are also available for study in these libraries. The titles of the applications of which specifications have been printed were listed in various issues of the *Official Gazette of the U. S. Patent Office* from April 20 to July 13, 1943, but this journal did not publish abstracts of them. The Alien Property Custodian, however, has published abstracts of some 7,500 vested chemical patents and pending patent applications (including most of those cited in this report), for information regarding which address the Office of Alien Property Custodian, Field Building, Chicago 3, Illinois.

(3) Abandoned Patent Applications of enemy nationals and residents of occupied territory. These applications, a small portion of which has been vested in the Alien Property Custodian, are on file in the U. S. Patent Office. Some of these cases have possibly become abandoned at the behest of the German Government. A very thorough search of these files has been made covering the period from about 1935 on. Permission to inspect the file or to make copies in these cases may be obtained from the Alien Property Custodian, Washington, D. C., by patent attorneys and technical representatives of American firms.

(4) Unfiled Patent Applications and technical data, submitted to the Alien Property Custodian under his General Order No. 12. This material comprises for the most part files of patent solicitors in cases of inventors who are either enemy nationals or residents of occupied territories, and files of patent and other departments of American corporations having various types of contractual relations with organizations or individuals of enemy nationality or those residing in enemy-controlled territory. The material falling in this category is, therefore, either in the form of executed patent applications or in the form of correspondence and technical reports as received from abroad for use in preparing patent applications. For the purposes of identification the registration system of the Alien Property Custodian (TC numbers) has been adopted.

All the unfiled cases cited in this report have been vested by the Alien Property Custodian and are on file in his office at Washington, D. C. which should be addressed by patent attorneys and technical representatives of American firms desirous of examining them. For information on additional cases which may subsequently be vested in the above four categories, address the Alien Property Custodian, Washington, D. C.

RAW MATERIALS—Monomers, Preparation, Concentration, Etc.

Acrylonitrile

Preparation and Purification. I. G. Farbenindustrie A. G., A.P.C. Pending Application Serial No. 378,567, February 12, 1941. Separation of divinyl acetylene formed in the copper salt catalyzed combination of acetylene with hydrogen cyanide by washing with water. Divinyl acetylene is insoluble; whereas acrylonitrile is recovered by continuous distillation of the azeotrope with water.

Acrylonitrile. I. G. Farbenindustrie A. G. German Application I 49392 IVa/120. Hutz & Joslin files. A.P.C. New York office. TC 1086 (c). Diluted vapors of ethylene cyanohydrin are dehydrated at 310° C. over bauxite. Better than 80% conversion is obtained.

Butadiene

Dehydrogenation

Butane Dehydrogenation. Guilio Natta. A.P.C. Pending Application Serial No. 340,228, June 12, 1940. Butane is converted to butadiene in a two- or three-step process by heating to 500 to 600° C. in the presence of carbon

[1] Present address, Armstrong Cork Co., Lancaster, Pa.
[2] Office of Assistant Deputy Rubber Director for Research and Development of Synthetics, Polymer Research Branch, C. S. Fuller, Chief.

dioxide and of oxygen (if hydrogen recovery is not desired). After compression and separation of carbon monoxide and hydrogen the gaseous mixture, after addition of more carbon dioxide is passed at 600 to 650° C. over dehydrogenating catalysts (metals of the eighth group of the periodic system), resulting in conversion of butane and butylene. A third treatment under non-specified conditions is suggested to obtain a higher butadiene concentration. No example, but conversion yields of 30 g. butadiene from 1 m^3 of water gas are given.

The same inventor (A.P.C. Application Serial No. 289,711) suggests dehydrogenation of alpha and beta butylenes over 5% Ni on Bentonite at 500 to 600° C. with equal volumes of carbon dioxide. A 50% and higher conversion per pass (total conversion higher than 80%) with little carbon and polymer deposits on catalysts is claimed. Reaction products are cooled rapidly to prevent reversion of reaction. Butadiene in concentrations satisfactory for sodium polymerization is obtained after separation of butylene by solvent extraction processes. Carbon dioxide is recovered.

By adding oxygen it is claimed that the formation of water vapor supplies sufficient heat for the endothermic reaction to proceed. No example or detailed description of the process is given.

Dehydrogenation of Butylene. I. G. Farbenindustrie A. G., A.P.C. Pending Application Serial No. 338,380, June 1, 1940. A mixture of one part by volume of butylene—2 and 0.8 to 3 parts oxygen is passed at 540° C. over zinc vanadate in a stainless steel tube. 100 to 300 parts by volume of butylene per hour are passed over one part of volume of catalyst. The emanating gases are cooled, freed of carbon mono- and dioxide, and butadiene separated by absorption with cuprous chloride. 15-25% of butylene/pass are converted with a total butadiene yield of 75%.

GLYCOLESTER PYROLYSIS

Butadiene. Treibs, A.P.C. Pending Application Serial No. 352,072, August 10, 1940. The conversion yields of diesters of 1.4 and 2.3 butylene glycol to butadiene (99.8% C_4H_6) drop below 96%, depending on the purity of the diesters. In the technique applied 100 g. 1.3 butylene glycol diacetate are passed hourly at 600° C. and 110 mm. Hg pressure through a quartz tube of 500 mm. length and 30 mm. diameter.

Butanediol. Treibs, Abandoned Application Serial No. 186,687, January 24, 1938. The quantitative hydrogenation of butanol-1-3 to butanediol 1.3 over nickel at 40 atmospheres or in the vapor phase over copper on pumice is disclosed. (Rejected over prior art).

OTHER METHODS

Selective Hydrogenation of Acetylenics. Klein, I. G., A.P.C. Pending Application Serial No. 397,105, June 7, 1941. The selective hydrogenation of even small quantities of acetylene in olefin mixtures in the presence of carbon monoxide is disclosed. (This process may find application in the purification of butadiene and in the conversion of vinyl acetylene to butadiene).

Halogenation and Dehydrohalogenation of Butylene. I. G. Farbenindustrie, A. G., Abandoned Application Serial No. 156,092, filed July 28, 1937. (Abandoned because of rejection over prior art).

Dehydrochlorination of Dichlorobutane. I. G. Farbenindustrie A. G., Abandoned Application Serial No. 164,502, September 18, 1937. (Rejected because of lack of invention). Better than 80% conversion of dichlorobutane to butadiene by dehydrochlorination over electrically heated wires is claimed.

Reduction of Monovinylacetylene. I. G. Farbenindustrie, A. G., Abandoned Application Serial No. 173,116, November 6, 1937. The use of chromous salts is suggested for the reduction of monovinyl acetylene to butadiene.

1.4 Dichlorobutane, 4.4' Dichloro Dibutylether. Frieschmann, et al. A.P.C. Pending Application Serial No. 334,-582, May 11, 1940. By treating tetrahydrofuran under pressure with anhydrous hydrogen chloride and bismuth trichloride 1.4 dichlorobutane and small amounts of 4.4' dichlorodibutylether are formed.

Butadiene Concentration. Unfiled disclosure of I. G. Farbenindustrie A. G., German Application I 63375 IVd/120, December 29, 1936 (TC 1100). Continuous operation of cuprous salt absorption apparatus for butadiene and monoolefins consisting of horizontal vessels equipped with stirring devices around a horizontally located axle for absorption and desorption purposes. The monoolefin fraction contains 1% to 2% butadiene; an intermediate fraction is returned to the process; butadiene is liberated at 80° C. Utilization of cuprous chloride absorbent amounts to 85%.

Chlorobutadienes

Chloroprene. Landa, A.P.C. Serial No. 407,672, August 20, 1941. A vapor phase one-step synthesis of chloroprene is effected by passing acetylene and hydrogen chloride gas over cuprous chloride-ammonium chloride catalyst supported on a kaolin carrier, at 180-200° C. Chloroprene of 80% concentration is obtained which is contaminated with less than 10% dichlorobutene.

Chloroprene. Landa, Abandoned Application Serial No. 250,838, January 15, 1939. Reaction of acetylene with vinyl chloride to give chloroprene is disclosed.

Di-Tri-Tetrachlorobutadiene. Bauer, A.P.C. Pending Application Serial No. 250,066, January 9, 1939. (Now U. S. Patent No. 2,267,712). The preparation of di-, tri-, and tetrachlorobutadienes by dimerization of di- and trichloroethylene is disclosed. Physical constants are given. It is stated that rubber-like masses are formed by polymerization with aluminum chloride catalyst, but not with peroxide catalysts. Copolymers with butadiene, styrene, acrylonitrile, chloroprene, vinyl esters are mentioned.

Pentachlorobutadiene. Wimmer, A.P.C. Pending Application Serial No. 336,004, May 18, 1940. Pentachlorobutadiene is formed in a continuous process in 36% yield from trichloroethylene at 250-300° C. and 20 atmospheres with iron chloride catalyst.

Dichlorobutenes by Vapor Phase Chlorination of Butadiene. Schmidt, A.P.C. Pending Application Serial No. 287,249, July 29, 1939. Yields of 34.3% 1.2 dichlorobutene-3, 39.7% 1.4 dichlorobutene-2, and 23.1% mainly tetrachlorobutane are claimed by diluting butadiene vapors with inert gases and chlorinating at —20 to +20° C.

Cuprous Chloride Regeneration. Stadler, Auerhahn, A.P.C. Pending Application Serial No. 324,384, March 16, 1940. When acetylene conversion to monovinyl acetylene in a solution of 100 p. cuprous chloride, 75 p. am-

(Continued on page 590)

The Canadian Government Synthetic Rubber Plant at Sarnia, Ont.

Robert G. Seaman

BUILT by the Canadian Government's Polymer Corp., Ltd., and integrated with the synthetic rubber plant construction program in the United States, there is located at Sarnia, Ont., Canada, across the river from Port Huron, Mich., and about 60 miles from Detroit, a synthetic rubber plant which can claim the distinction at the present time of being without an exact counterpart anywhere in the world. Within the area of this 185-acre plant are produced butadiene from petroleum, styrene from ethylene and benzene, isobutylene from petroleum, GR-S (Buna S), and GR-I (Butyl) synthetic rubbers. The estimated annual output is 34,000 long tons of GR-S and 4,000 long tons of GR-I.

Construction was started on August 10, 1942, and 13 months and 19 days later, on September 29, 1943, by using styrene made at the plant itself and butadiene imported from the United States, commercial production of GR-S was begun at half-capacity. In December, 1943, the second half of the GR-S plant was put in operation, and operations began in the GR-I plant during this same month. In February, 1944, the whole project was virtually completed and in full-scale operation.

To build this new industry at Sarnia five famous engineering firms and four big contractors employed a maximum of 5,579 men and women at the site. With the last construction man gone, it is estimated that the plant will employ 1,294 men and 325 women. These include executives, maintenance personnel, office and laboratory staffs, police, firefighters, hospital staff, truck drivers, staff house workers, waitresses, and operational employees.

Operation is on a management-fee basis for the Canadian Government. St. Clair Processing Corp., Ltd., a subsidiary of Imperial Oil, Ltd., will have charge of the units producing butadiene and isobutylene, the GR-I rubber, and the power plant and pumping station. Dow Chemical of Canada, Ltd., a subsidiary of Dow Chemical, Midland, Mich., will operate the styrene plant. Canadian Synthetic Rubber, Ltd., a subsidiary of four Canadian rubber processing companies: Goodyear Tire & Rubber of Canada, Ltd., Firestone Tire & Rubber Co. of Canada, Ltd., Dominion Rubber Co., Ltd., (itself a subsidiary of the United States Rubber Co.), and B. F. Goodrich Rubber Co. of Canada, Ltd., will operate the GR-S plant.

General Operation and Organization of the Polymer Plant

The production of approximately 40,000 long tons of GR-S and GR-I at the Polymer plant will require annually 500,000 tons of coal for power and process steam generation, more than 45 billion (54 billion U. S. gallons) imperial gallons of water, 19 million (22.8 million U. S. gallons) imperial gallons of light and petroleum, 2½ billion cubic feet of petroleum gas, 2¼ million imperial gallons (2.7 million U. S. gallons) of benzol, and enough brine to contain 3,500 long tons of salt, in addition to great quantities of soap, acids, and other raw materials. The plant is conveniently close to the salt mines at Sarnia, and in Polymer Corp. tank trucks the brine is transported from the Dominion Salt Co. for use in the coagulation of the GR-S latex.

For general operational purposes the Polymer plant may be considered as consisting of ten more or less separate units, which then might be further organized as follows:

(1) Petroleum processing plant
   (a) Supersuspensoid cracking coil unit
   (b) Light ends recovery unit
   (c) Isobutylene extraction unit
   (d) Butylene concentraction unit
   (e) Butadiene unit
(2) Styrene plant
(3) GR-S plant
(4) GR-I plant
(5) Steam and power plant
(6) Pumping station

Petroleum Processing Plant

One of the most interesting things about the Polymer Corp. plant is the extensive amount of equipment and processes used for converting petroleum into the synthetic rubber ingredients, butadiene and isobutylene. At Sarnia the butadiene is processed from normal butylene, one of the hydrocarbons obtained from the light ends piped from the adjacent Imperial Oil refinery. In addition to butylene, isobutylene for making GR-I, and ethylene for making styrene are also obtained from these light ends.

SUPERSUSPENSOID CRACKING COIL. The supersuspensoid cracking coil is an ingenious adaptation of the more or less standard refinery thermal cracking unit. This type of unit had been developed by Imperial Oil Co., Ltd., prior to the war and was in successful operation at Sarnia before any rubber production was considered. This type of cracking unit produces twice as much butylene as the standard thermal unit of the same capacity and has the advantage of flexibility of operation so that with certain modifications to existing units and by the installation of some additional capacity it is possible to supply the rubber project with the requisite amount of feed stock. The new coil, which operates in conjunction with four similar, but smaller coils already serving the Imperial Oil refinery, is located in the refinery and not on the Polymer site. A view of the Supersuspensoid unit showing cracking coil stack and main column is shown in Figure 1.

In operation the supersuspensoid coil is charged with naphtha and gas oil, and then by means of moderately high temperatures and pressures, butylene and isobutylene are produced together with ethylene and other gases and liquids. Pipes from the coils convey to the light ends recovery unit at Polymer, 6,255 barrels a day of light and liquid petroleum and 19.4 million cubic feet of petroleum gases. Part of the fuel gas stream which is not used in either the rubber or refining processes is used in the plant process furnaces and for the operation of compressors. The balance is returned to Imperial Oil, Ltd., for use in refining operations. All of the liquid hydrocarbon is returned to Imperial Oil to be used in its gasoline manufacture.

LIGHT ENDS RECOVERY UNIT. The major operation

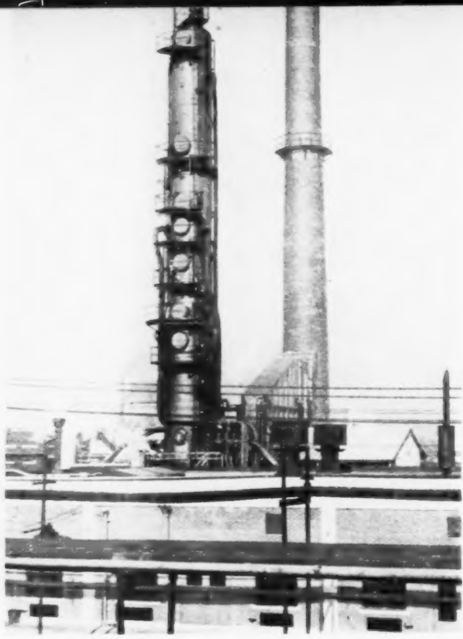


Fig. 1. Supersuspensoid Coil Stack and Main Column

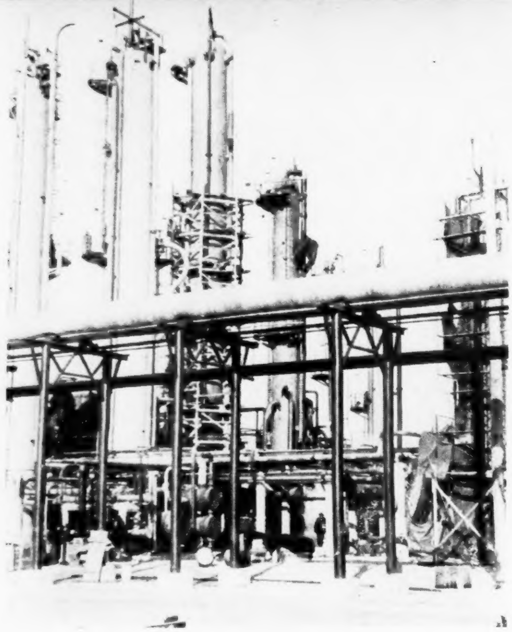


Fig. 2. Light Ends Recovery Unit

of the light ends recovery unit is repeated fractional distillation by which the hydrocarbon streams from the supersuspensoid coil are broken down into ethylene, fuel gas, and the butane-butylene cut which contains isobutylene, butylenes, butane, and isobutane. The gases from the supersuspensoid coil pass through a Girbotol unit to remove hydrogen sulphide. The liquid hydrocarbons go through a soda wash unit to remove mercaptans and are then dried before mixing with the processes gases.

The liquid and gaseous hydrocarbons are cooled and are then further fractionated in the demethanizer where methane and some heavier materials are removed. From the bottom of the demethanizer the hydrocarbons enter the deethylenizer in which ethylene for styrene production is separated, and from which ethane is released to the gas lines. The depropanzer next removes propane and propylenes which are returned to the Imperial Oil refinery. Finally in the debutanizer, butane and butylenes are separated from pentanes and heavier materials. A part of the light ends recovery unit is shown in Figure 2.

Isobutylene Extraction Unit. The output from the light ends unit now consisting mostly of butane, isobutane, butylene, and isobutylene is piped to Horton spheres for storage until used in the isobutylene extraction unit. Because the boiling points of all of these materials are so close together, separation must be accomplished by chemical treatment. The first constituent removed is isobutylene. This is done by treatment of the mixture with mineral acid. A portion of the isobutylene removed by this method is used for GR-I production and the remainder returned to Imperial Oil, Ltd.

Butylene Concentration Unit. After removal of the isobutylene the remaining hydrocarbons of the C_4 cut go to the butylene concentration unit, where by a combination of mixing with the proper chemical compound and distillation in a specially constructed 165-foot tower normal butylene is separated from the butane and isobutane. The latter is returned to the Imperial Oil refinery after removal of the added chemical, and the butylene goes next to the butadiene unit for conversion into this raw material for GR-S.

Butadiene Unit. The butadiene unit has two separate sections, one for carrying out the dehydrogenation of the butylene to butadiene and the other for concentration and purification of the butadiene. The dehydrogenation step takes place in a reactor at a relatively high temperature with the help of superheated steam and a catalyst. A preheating furnace before the reactor has two distinct units, one for heating the hydrocarbon stream and the other for superheating the steam. The output of the reactor goes to oil and then to water quench towers for cooling and scrubbing out heavy ends and C_3 gases. After repeated processing of this type, dilute butadiene mixed with unreacted

Fig 3. Butadiene Dehydrogenation Unit

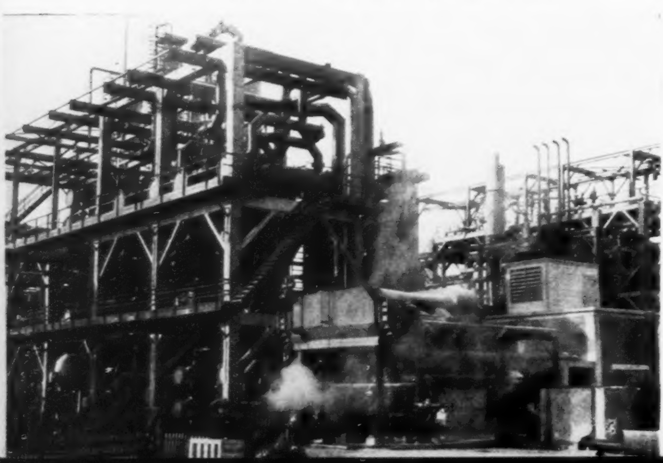
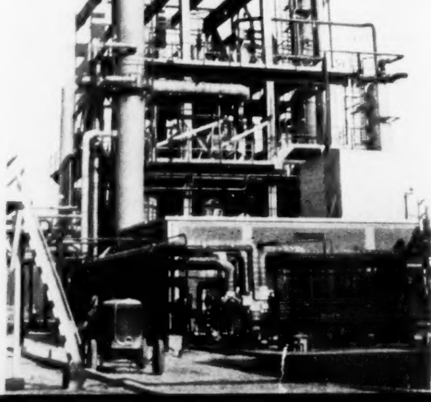
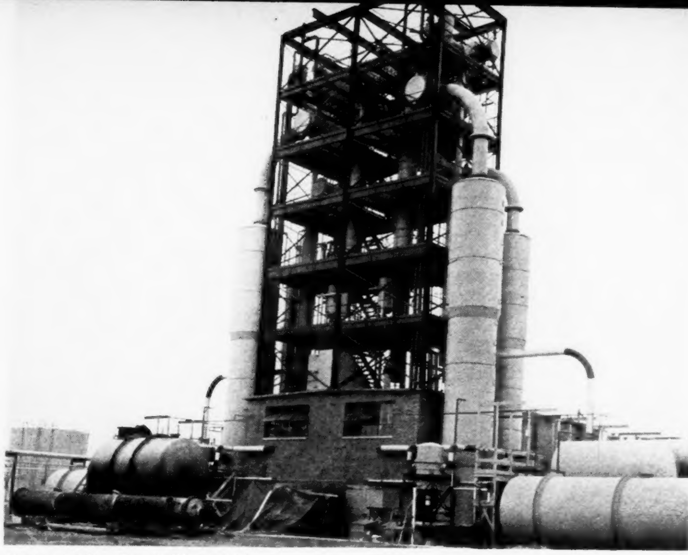


Fig. 4. Butadiene Extraction Unit





National Film Board Photograph

Fig. 5. Styrene Purification Unit

National Film Board Photograph

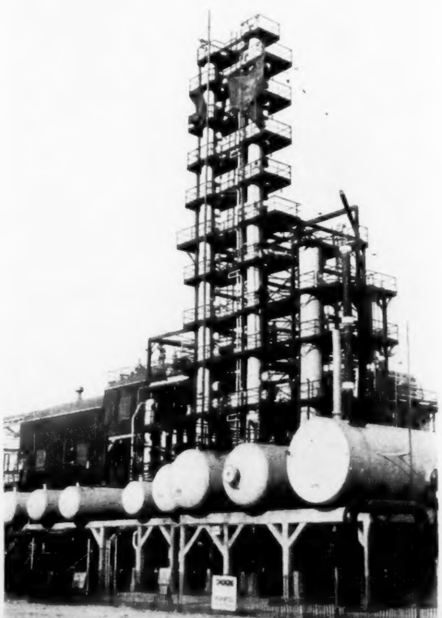
Fig. 6. GR-S from Automatic Baler and Weighing Machine

butylene and other materials is obtained. The butadiene dehydrogenation unit appears in Figure 3.

Extraction of the butadiene from the unreacted butylene and other materials is carried out by selective solvent absorption and removal of the added solvent by heat. The butadiene is now sufficiently pure for storage and use in the manufacture of GR-S. A view of the butadiene extraction unit is pictured in Figure 4.

THE STYRENE PLANT. The styrene plant is divided into three parts: one for the production of ethyl-benzene, one for the dehydrogenation of ethyl-benzene, and one for the concentration and purification of the crude styrene. Ethylene from the light ends recovery unit and benzene brought to Sarnia by lake tanker from Sault Ste. Marie, Ont., are reacted with the help of a catalyst to produce ethyl-benzene. In another building the ethyl-benzene is dehyrdogenated to produce crude styrene. In a third building the concentration and purification of the styrene takes place mostly by means of fractional distillation. Unreacted ethyl-benzene is removed and returned to the dehydrogenation building for re-running. The styrene purification building and towers are shown in Figure 5. The annual capacity of the styrene plant is 10,000 short tons. Skill in designing all three units of this plant and the extensive use of automatic control and recording instruments make possible operation through three eight-hour shifts daily with only six men per shift.

Fig. 7. A Section of GR-I Plant



GR-S (Buna-S) Plant

The GR-S plant consists of two identical parallel units operating independently, which, since they are of the same "standard design" as those described in the August, 1943, issue of INDIA RUBBER WORLD, pages 457-460, will not be described in much detail here. The copolymerization of the butadiene and styrene is carried out in batch reactors in an aqueous emulsion in the presence of a catalyst, and the latex so produced is coagulated in a two-step operation using brine and acid. The rubber is filtered on rotary filters, dried in a continuous drier, and baled. A part of the automatic weighing and baling machine which discharges one 75-pound bale of GR-S every 87 seconds from each of the two units is revealed in Figure 6.

GR-I (Butyl) Plant

The isobutylene from the isobutylene extraction unit is given a further drying and is then redistilled to remove any heavy ends before being mixed with a small amount of isoprene, a catalyst, and an inactive solvent and fed into the polymerization reactor. In this reactor, which is maintained at a very low temperature, the GR-I polymer is formed. The contents of the reactor containing unreacted isobutylene, the solvent, the GR-I polymer, and the catalyst are transferred to a flash tank where the temperature is high enough to vaporize the unreacted isobutylene and the solvent and also to render inactive any of the catalyst that may be present. The GR-I in the form of a slurry in water

Fig. 8. Polymer Steam and Power Plant

National Film Board Photograph

is filtered and washed; next it is dried in the same manner as the GR-S in a continuous circulating air drier and prepared for shipment. A view of the GR-I plant is shown in Figure 7.

Steam and Power Plant

The Polymer steam and power plant, which has a rated capacity of 1,375,000 pounds of steam an hour at 450 pounds per square inch pressure, is the largest steam plant in Canada and one of the largest producers of process steam in the world. Most of the steam is used in the various processes for making synthetic rubber, and the remainder is used to generate 32,000 h.p. of electric energy to run motor-driven equipment throughout the plant.

The power house contains five boilers 24 feet square and 100 feet in height. Coal consumption is at the rate of 500,000 tons a year and is stockpiled during the summer months at a rate of two shiploads a week. It is ground in B & W pulverizers so that 80% will pass a 200-mesh sieve and is blown into the furnace with air preheated by exhaust gases. Combustion of this powdered coal is very complete, and very little coal goes up the stack in smoke. Boiler feed water is treated and filtered before it enters the boilers. The Polymer steam and power plant is shown in Figure 8.

The Pumping Station

The water required for the various processes in the synthetic rubber plant must be cool, and this was one reason the Sarnia site was chosen. The water from the St. Clair River has an even temperature of 34° F. in winter to about 70° F. in summer, and this made unnecessary the installation of expensive water cooling systems. Six steam-driven pumping units handle 86,000 imperial gallons of water a minute (150,000,000 U. S. gallons a day), and there are two electrically driven stand-by pumps with a capacity of 57,600,000 U. S. gallons a day.

Summary and Conclusions

Thus Canada, like the United States and in cooperation with us, has provided itself with the means of producing synthetic rubbers in sufficient tonnage to replace its normal peacetime requirements of 30,000 to 35,000 tons of natural rubber. Since early 1942 stocks of rubber, as well as information within the two countries, have been pooled, and a decision was reached at the beginning of the program by the best technical experts of both countries that the most satisfactory substitutes for natural rubber under existing conditions would be Buna S, Butyl, and neoprene. All patents, including some German patents, registered in the United States and Canada were pooled and made available to Canada.

The Polymer Corp. did not have to work out any processing problems except those concerned with the steam and power plant and the feed preparation units. The technical problems of the feed preparation units were worked out in detail by R. K. Stratford and R. H. Smith, of Imperial Oil Co., Ltd. Mr. Stratford, who is head of the research department of Imperial Oil, is an expert on the cracking of petroleum and is as well known in this field elsewhere in the world as he is in his native Canada.

Polymer Corp. was incorporated in February, 1942, and was authorized on March 27, 1942, by Order-in-Council 2369 at the instance of Hon. C. D. Howe, Minister of Munitions and Supply, for the purpose of erecting and arranging for the operation of a plant capable of producing the synthetic rubber required for the Canadian war program. It has been recently stated by J. R. Nicholson, managing director of the Polymer Corp., that the policy of the Canadian Government is to operate these synthetic rubber plants after the war for the benefit of the Canadian people.

The directors are: R. C. Berkinshaw, president; D. W. Ambridge, vice president; J. R. Nicholson, managing director; G. A. Labine; A. C. Guthrie; W. R. Campbell; and A. J. Crawford. Other officers include: R. L. Hearn, chief engineer; J. A. Knight, assistant chief engineer; F. S. Lazier, construction works manager; J. W. Gemmell, manager of job administration; G. S. Whitby, head of chemical division; R. H. Brunk, traffic manager; B. C. Kitchen, coordinator of purchasing; and H. R. Smyth, controller.

Abstracts of Technical Data

(Continued from page 586)

monium chloride, one p. powdered copper, 110 p. water becomes slower, 10% of solution is withdrawn, heated to 70 to 80° C., and 10 cc. 36% hydrochloric acid are added per liter of cuprous chloride solution, and nitrogen gas passed through the solution. When a filtered sample upon dilution with water yields pure cuprous chloride, the bulk of the treated solution is filtered and returned to the process. When necessary, the contact liquid is replenished.

Isoprene

Isoprene Synthesis. Friedrichsen, (I. G.), A.P.C. Application Serial No. 377,513, February 5, 1941. Trimethylated dioxanes, 1.3, formed by condensation of amylenes with formaldehyde, are dehydrated at 250° C. over an acidic phosphate catalyst.

Other Chemical Substances

Separation of Olefins from Paraffins. Guinot, A.P.C. Pending Application Serial No. 216,105, June 27, 1938. The solubility ratio of propylene/propane in carbitol is 4.31; the solubility of propylene is 0.41=volume (at 20° C. and 760 mm.) per volume of solvent.

Benzene Hydrocarbons from Coal. Juettner, A.P.C. Pending Application Serial No. 363,155, October 28, 1940. From 100 g. mineral coal by treatment with nitric acid 21 g. benzene hydrocarbons (chiefly benzene, toluene, xylene, slight amounts of diphenyl) 2 g. phenols, 2 g. difficultly volatile hydrocarbons and phenols, 1.2 g. pyridine, and a certain quantity of volatile fatty acids are obtained.

Aromatization and Dehydrogenation of Paraffins. Kolling et al, A.P.C. Pending Application Serial No. 291,380, August 22, 1939. Magnesite is impregnated with ammonium chromate and calcined. (400 Cr_2O_3 per 1000 g. magnesite). 15-20% conversion per pass of propane to propylene at 480° C. is disclosed. Absence of excessive side reactions, carbon deposits, and insensitivity to olefins is claimed.

Acetylenic Carbinols. Reppe et al, A.P.C. Pending Application Serial No. 327,820, April 4, 1940. Copper oxide deposited on silica gel is converted to the acetylide, and excess acetylene and carbonyl compound reacted under pressure at 100-120° C., the acetylene is recycled. With formaldehyde 96% yields of butine —2 diol 1.4 with little propargyl alcohol and methanol are obtained.

(To be continued)

Use of Rubber in Power Drive Lines[1]

James H. Booth[2]

CONSIDERING the use of a rubber coupling in power drive lines as a method of securing torsional flexibility and changes of angular relation, the designing engineer finds many advantages. Checking these advantages, we have a coupling that is free from lubrication requirements and is not affected by dust and dirt. The shafting lines may be kept on center, which is a desirable feature. Most mechanical-type couplings require the shafting to be operated off centers as experience has shown severe brinelling when the mechanical type is run with shafting that is operated on centers. Shafts working in nearly perfect alinement have less tendency to go into vibrational periods, and the power loss is reduced.

A rubber coupling permits wide ranges of torsional flexibility, depending on the rubber hardness, and also on the method of using the rubber, as in shear or compression. Rubber in the drive line assists in breaking up torsional vibration periods by virtue of the natural hysteresis characteristics of the rubber. Power losses are at a minimum, as the power used to turn the joint to a definite angle is stored in the rubber and transmitted back to the shaft as it returns to its neutral position. In most designs slip splines may be omitted since rubber in the shaft line permits end deflection along the longitudinal axis of the shaft.

Description of Various Coupling Types

There are many methods of applying rubber in power drive lines, but this discussion will be confined to the limitations of a design composed of rubber blocks in a housing, using rubber in compression for the driving torque. However for reference we should examine Figure 1, which shows a coupling in which the rubber is used in shear. While many satisfactory applications of rubber in shear have been made, this design has two undesirable features which greatly limit its use. The shear-type design depends entirely on the rubber bonded to a metallic surface, and, as the rubber is very soft when used in shear, this design requires large diameters, which is a distinct handicap for most installations. Shear-type couplings are limited to designs where minimum angularities are required and small amounts of power are to be transmitted.

The coupling we shall discuss in detail is shown on Figure 2. This coupling, designed and patented by F. M. Guy, is manufactured in England under the name "Layrub." Before the war the coupling was also manufactured in Germany, France, and Italy. In the United States this type of coupling is manufactured for marine, industrial, and accessory use by the Morse Chain Co. under the trade name "Moreflex." On all types of vehicles and equipment where power is transmitted to the drive wheels, such as cars, trucks, street cars, etc., this product is manufactured by Thompson Products, Inc., and is known as the "Thompson coupling." The two English racing cars that were designed for the maximum speed record: namely, the "Railton-Cobb" and the "Thunderbolt," were equipped with this type of coupling in the power drive line.

Figure 3 shows the arrangement on the "Railton-Cobb," and it will be noted that there are eight installations of this rubber coupling in the drive lines. The "Railton-Cobb" made an official record of 368.85 miles per hour, and the "Thunderbolt's" official record was 357.50 miles per hour. There is no doubt that the rubber couplings on these cars assisted in attaining these high speeds, for any rubber in the drive line has the ability to absorb power which is finally placed back in the drive line. When the driving wheels on any high-speed car leave the ground and consequently attain higher revolutions than the normal driving speed, there is a sudden shock loading throughout the drive when the wheels return to a traction position. With rubber in the drive line a large amount of the energy of this shock loading is absorbed by compressing the rubber in the coupling, and, as the rubber is returning to its normal driving position, this energy is transmitted back into the power line.

[1] Presented before the Rubber & Plastics Group, American Society of Mechanical Engineers, Hotel Pennsylvania, New York, N. Y., Dec. 2, 1943.
[2] Chief engineer, Thompson Products, Inc., Detroit, Mich.

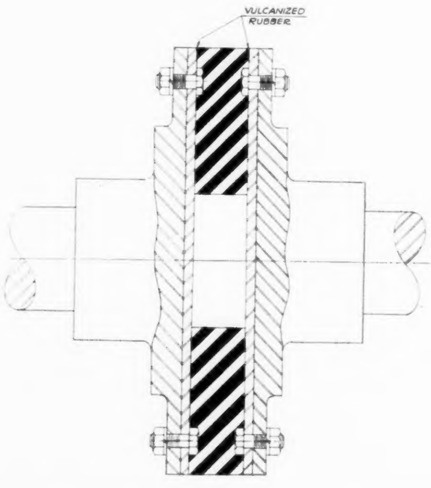


Fig. 1. Coupling Using Rubber in Shear

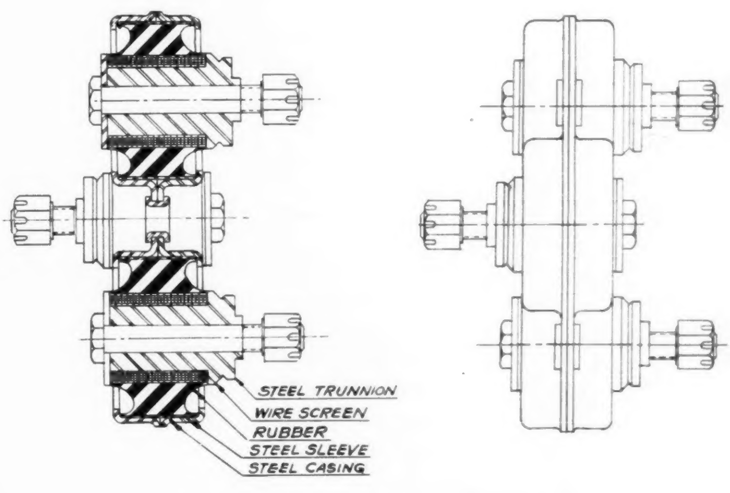


Fig. 2. Coupling Using Rubber in Compression

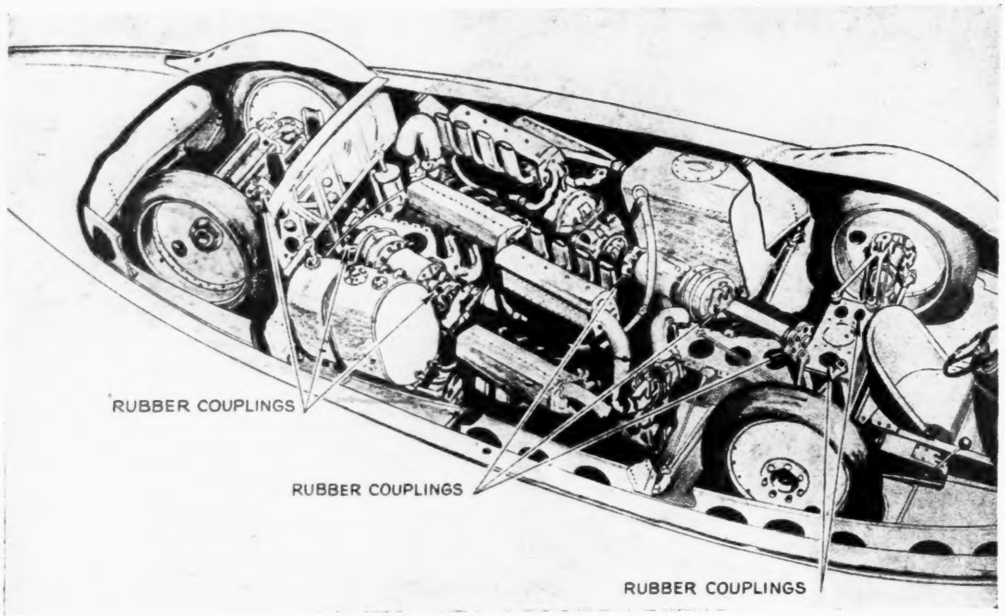


Fig. 3. Rubber Couplings in "Railton-Cobb" Racing Car

Physical Characteristics of Rubber in Couplings

Having considered the advantages of using a rubber coupling, we shall now proceed to discuss some of the physical characteristics of the rubber block used in this coupling. This block consists of a metal or fabric outer shell and an inner core composed of rolled-up wire screen. Figure 2 shows a sectional drawing of the block with rubber bonded to the outer metal sleeve and impregnated through the wire screen core. This wire screen core was developed after many attempts had been made to make a satisfactory bond between the rubber and a metal core. Most rubber engineers request an adhesion load on a bonded surface of this type not to exceed 100 pounds per square inch, and tests substantiate this figure as rubber bonded to a metal core has not proved adequate. A core composed of rolled-up wire screen permits the rubber to flow through the open mesh, and, assuming that a rubber is used of 3,000 pounds per square inch tensile and the multiple layers of screen result in a projected area of half screen and half rubber, the bond secured in this manner amounts to approximately 1,500 pounds per square inch, as compared with the 100 pounds per square inch of the bonded-type core. After the block has been molded the outer shell is swaged to place the rubber under compression since experience has shown that the rubber block has a higher fatigue life in a compressed condition. Compressing the block reduces the load rate of the rubber to move endwise or at right angles to the compression load. This is a distinct advantage on vehicle drive line installation as it results in low thrust loads on the drive line bearings, which will be discussed in more detail later.

The finished shape of the rubber block is highly important and extensive tests have resulted in the contour shown in Figure 2. While a certain amount of theory is successful in contour design, best results are usually obtained by making minor alterations in the contour and running each possibility to failure on test equipment.

The completed blocks are carried in a housing, which usually consists of two stampings riveted together, as shown in Figure 2. Since the war many variations have been made in the housing, due to the requirements of military vehicles, especially tanks. Some tank applications require that the flexible coupling be placed between the final driving cog and the drive gears. In some installations the coupling was made part of the fly wheel assembly, and in others the coupling was placed between the drive gears and the torque converter.

Rubber hardness is highly important to the flexibility of the coupling, and we can inspect the difference in deflection of two hardnesses of a rubber block, which is

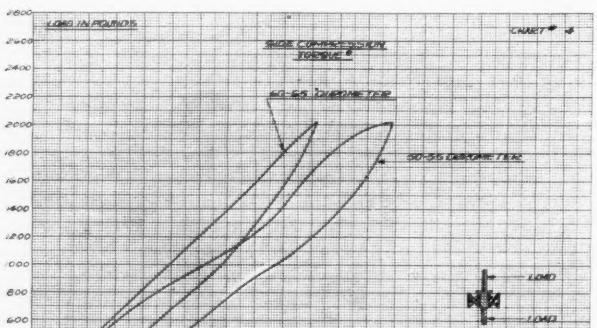


Fig. 4. Deflection *vs.* Load for Different Hardness of Rubber

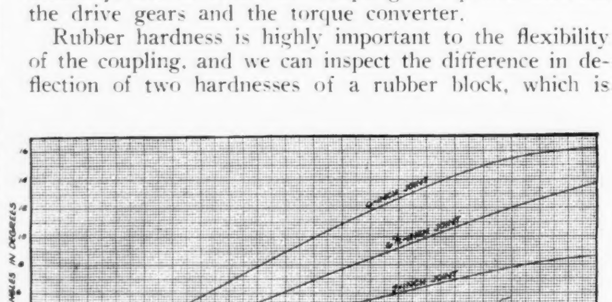


Fig. 5. Angular Deflection of Various-Size Couplings—Same Hardness

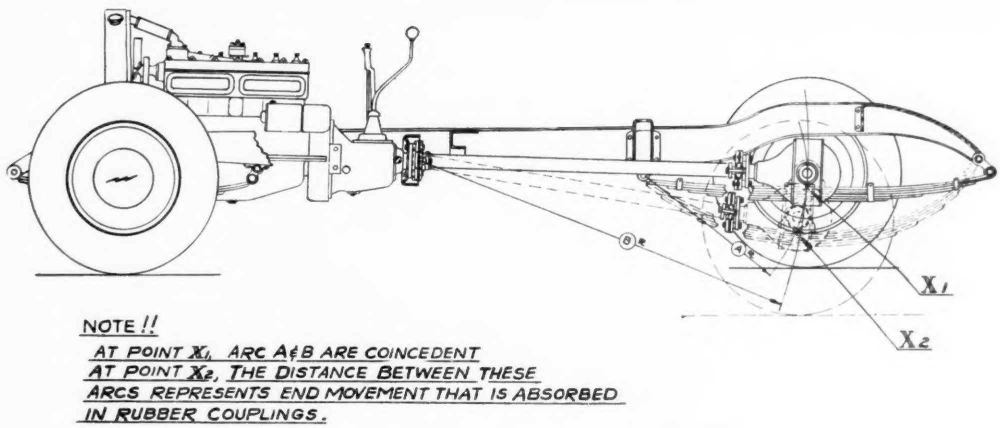


Fig. 6. End Thrust on Coupling in Typical Installation

shown in Figure 4. It will be noted that on loads up to 600 pounds the difference in deflection is small, but on the higher loads the difference in deflection is large, which means that a coupling using blocks of the softer rubber will have much greater torsional deflection under shock loading.

The angular deflection between the various sizes of couplings of one rubber hardness is shown in Figure 5. It will be noted from Figure 5 that the deflection angle of the completed coupling is quite sensitive to the diameter of the coupling and block cross-sectional dimensions. From this same chart we observe that at 200-foot pounds torque the deflection of the six-inch coupling is approximately twice that of the seven-inch coupling.

In addition to angular deflection this coupling receives end thrust load, as illustrated in Figure 6. This chart shows a typical installation in a motor vehicle of the Hotchkiss drive design. In this design the drive from the axle is taken through the leaf springs to the frame, and, as the axle moves up and down owing to the spring travel, the arc described by the drive line "B" is much greater than the arc described by the spring portion "A." These arcs result in an effective shortening and lengthening of the drive shaft. Where mechanical couplings are used, a slip spline is provided, but in the case of the rubber coupling the effect is obtained by end deflection of the rubber as it is not usually necessary to use a slip spline where these couplings are installed. The end loads resulting from this type of movement for three sizes of couplings are shown in Figure 7.

Angular deflection of the coupling results in energy being consumed as the rubber is deflected owing to angle, but this energy is transmitted back to the power line as the rubber returns to its normal position. Tests at the University of Michigan by Professor Benjamin F. Bailey show (Figure 8) the efficiency of the coupling to be almost 100% up to angles of 16 degrees. Quoting from Professor Bailey's report:

"In fact, some of the results show an apparent gain in the joint, which, of course, is impossible. In other words, the loss in the joint, if any, was less than could be observed with any degree of consistency. Certainly the loss was not greater than one-half of one per cent., even at the extreme angles used. In the case of the ordinary joint (mechanical joint) used for comparison, it will be noted that the loss increased quite consistently and became very large with the largest angle. An attempt was made to measure the loss with a slightly larger angle, but the noise and vibrations were so excessive that observers were afraid to continue. In the case of the rubber joint, using the greatest care it was impossible to detect any systematic indication of loss in the joint. The operation was perfectly smooth and noiseless, even at very extreme angles."

Coupling and Shaft Design Data

The selection of shaft size and length is highly important in any power drive installation, and, while the rubber coupling will change the natural frequency period of the whole assembly, it is well to select a shaft having a natural vibration frequency above the requirements of the installation that is being considered.

Quoting from S. Timoshenko's book on "Vibration Problems in Engineering," it is stated that: "The critical speed of a rotating shaft is that speed at which the number of revolutions per second of the shaft is equal to the frequency of its natural lateral vibrations."

A chart has been prepared which shows the critical speeds of tubular shafts of various diameters, wall thicknesses and lengths, and will be supplied to interested parties by the author upon request. Vibration periods of the whole drive line assembly often result in brinelling of the transmission and rear axle gears. In one truck unit that is used for excavation purposes, where the terrain is extremely rough, transmission life was increased approximately ten times by the installation of this type of rubber coupling in the drive line.

The formulae used for the selection of the correct rubber coupling for passenger cars are based on the horsepower rating of the coupling at 50 miles per hour, against the horsepower required to propel the vehicle at 50 miles per hour on a 6% grade. This is a constant rating based on torque capacity of the coupling. Experience

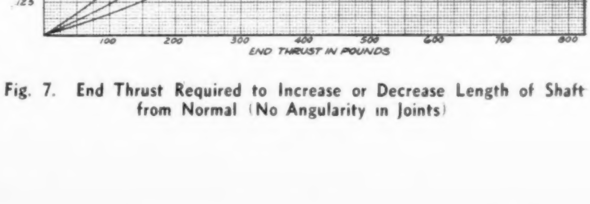


Fig. 7. End Thrust Required to Increase or Decrease Length of Shaft from Normal (No Angularity in Joints)

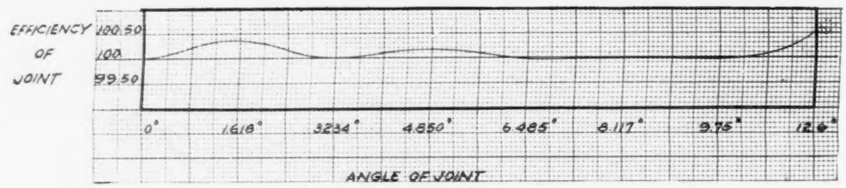


Fig. 8. Efficiency of Coupling for Various Angles of Deflection

indicates that the occasional load duty may be 300% of constant torque load. This reserve covers acceleration in gear, hill climbing, and braking through the propeller shaft. The actual horsepower required appears to be the best measuring stick and is determined by means of the following formulae.

$$HP = HP_L + HP_G + HP_A$$

Where

HP = Total horsepower
HP_L = Horsepower to overcome rolling resistance on level.
HP_G = Horsepower to climb grade
HP_A = Horsepower to overcome air resistance

$$HP_L = \frac{GVW \times RF \times 88m}{33000}$$

$$HP_G = \frac{GVW \times GF \times 88m}{33000}$$

$$HP_A = \frac{m^3}{3800} \qquad \frac{A\,v^3}{240000}$$

Where

GVW = Gross vehicle weight
RF = Rolling resistance factor = 0.015—for concrete roads
$GF = \frac{\text{Percent grade}}{100}$
m = Speed in miles per hour
A = Frontal area of car in square feet = 20 (estimated average)
v = Velocity in feet per second squared

To propel the vehicle at 50 m.p.h.

$$HP_L + HP_G = \frac{GVW \times 88 \times 50\ (0.015 + 0.060)}{33000} = \frac{GVW}{100}$$

$$HP_A = \frac{50^3}{3800} = 33$$

$$HP = \frac{GWV}{100} + 33$$

Having determined the required horsepower at 50 m.p.h. we can calculate the required coupling by the formula:

$$HP = \frac{320TR}{D}$$

Where

T = Torque capacity of coupling
R = Rear axle gear ratio
D = Nominal tire diameter in inches

Torque capacity of coupling based on 400 pounds per square inch is found from the formula:

$T = CF$

Where

T = Torque in pounds — feet
C = Capacity of trunnion block in pounds per square inch — constant duty = 400
F = Load factor of coupling and is found from:

$$F = \frac{rld}{6}$$

Where

r = Radius of trunnion arm in inches
l = Length of trunnion block core
d = Outside diameter of trunnion block core

The Future of Rubber Couplings

There is a promising future to the use of rubber in the power drive lines of postwar vehicles, as there is a tendency of passenger-car designers to add the body stiffness to the frame stiffness. For several years prior to the war the passenger-car manufacturers realized the advantages of stiffness in body and frame combinations to build a lightweight car for high performance. The resulting noise level of such a combination was extremely high, due not only to road noise, but also to gear and wheel noise transmitted through the drive mechanism. Rubber in the drive line reduces the noise level and should receive wide use in the postwar vehicle.

The Tired Future

F. L. Graves

THE current discussion regarding the postwar position of the butadiene-styrene (GR-S) type of synthetic rubber for tires becomes greatly confused when due consideration is given another elastomer which is expected to find extensive acceptance at war's end.

Large-scale production of the elastomer is not possible at this time owing to lack of plant facilities; however a sufficient quantity has been made available for complete laboratory and factory tests.

Laboratory tests have indicated that in tire formulation the elastomer provides tensile strengths some 40% higher than those of GR-S. Resistance to oxidation and abrasion is not so good as in GR-S, but these shortcomings are more than offset by an amazingly superior resistance to tearing and flex-cracking, a lower degree of heat generation in flexing, and improved resilience.

Tire fabrication on factory scale has been attended by enthusiastic acclaim on the part of tire builders; ease of processing and excellent building tack are stressed. Extensive field tests have shown that tires of all sizes will give the same durable service associated with prewar tires.

Cost of production again places the elastomer in a favorable competitive position with the present synthetic, GR-S. It is expected that plants will be set up in areas where labor costs are extremely reasonable, and since the elastomer is polymerized in a continuous process at ambient temperatures, power and equipment costs are minimum.

Both British and Dutch interests, in the light of their plantation investments, are showing considerable concern over the possibilities of this unusual elastomer. While the polymerization process remains a closely guarded secret, it can be revealed that the material is of plant origin, a very remarkable plant of Japanese extraction—botanically known as *Hevea brasiliensis*—Remember?

EDITORIALS

Let's Not Cry "Wolf" Too Soon

A COMBINATION of events, some unavoidable and some which although they could be foreseen to a certain degree, could not be prevented, has resulted in a delay in the synthetic rubber plant construction program and the consequent reduction in the output of such things as passenger-car tires in order to conserve GR-S for important military and essential civilian bus and truck tires. There is in some quarters an undercurrent of feeling that the difficulties plaguing the rubber program may develop a serious situation, and according to some reports, this feeling is shared by War Mobilization Director James F. Byrnes, who has been considering an official investigation.

In all probability the real danger in the present situation, if it produces a full-scale official investigation, will be the costly delays to the program brought about by hampering the men in government and industry who are contributing the major effort to working out the present difficulties. As far as can be determined, most of the facts are known, and action has been taken to make the necessary improvements, but the effects will not become apparent and complete evaluation will not be possible for some time to come. Requirements of the military for rubber have been increasing from month to month at a rate far above previous estimates and allotments for civilian use have had to be reduced. Only because of the high output of the butadiene-from-alcohol plants has the production of GR-S been able to keep about even with the advance estimates. Construction of butadiene-from-petroleum plants, because of low priorities, conflict with the aviation gasoline program for the same equipment and labor, and the ill-advised use of second hand equipment has fallen behind schedule. The operation of some of these plants already constructed has revealed the necessity of modifying some parts of the butadiene-from-petroleum process. The technical difficulties in the solving of all the problems of the commercial production of Butyl rubber were underestimated, and no significant tonnages of this type of rubber have yet been produced.

Demand for rubber by the biggest and most important customer, the Armed Services, will continue high, but if our military operations continue successful during most of this year, we should be over the hump of this demand. Essential civilian requirements may be met with difficulty; yet by continued education of the public in the use and care of the available supply of tires and other products, no extreme hardship should result. On the supply side, the largest petroleum-butadiene plant in the world should be working out its production kinks in March, and other units should contribute appreciable tonnages by the middle of the year. One Butyl plant is operating at half capacity, and the production outlook here is said to be somewhat more encouraging.

In order to be sure that everything possible is being done to correct the faults of all of the different types of government plants as they are revealed from the experience gained in the operation of those that have been completed, $30,000,000 has been recently allocated for the improvement of butadiene, styrene, copolymer, and Butyl plants. Additional facilities for the production of civilian tires are under construction by the industry, and reclaimed rubber production is at an all-time high and is assured of an adequate supply of scrap to continue its important contribution of extending our supply of both natural and synthetic rubbers.

Taking all these facts into consideration, the recent unfavorable publicity is probably not more than should have been expected following waves of optimism concerning the rubber program experienced a few months ago, but it is not sufficient to encourage further pessimism. As the Rubber Director himself said recently, ". . . the rubber production job is not finished by a long shot." The best way to get it finished, however, is not to continue to encourage excessive criticism of the administrators of the program in view of their excellent record of performance to date. A Fifth Progress Report from the Office of the Rubber Director should be made public within a few weeks and should be the best source of information regarding the current situation.

A Management Problem

FOR some years chemists and engineers, and particularly the younger ones who have not advanced to supervisory positions, in many instances have been underpaid in comparison with the salaries paid laboratory technicians and plant operators. Most of the latter have had the advantage of the collective action of the increasingly powerful labor unions; while the chemists and engineers who had spent years of study to fit themselves for their profession were too appreciative of the limitations that would be imposed upon them if they joined a labor union in order to improve their financial position. Although still opposed to the idea of unionization, they are becoming increasingly conscious of the advantages of some sort of an organization for collective bargaining.

That this situation may be a threat to the future advancement of science and American industry has been commented on by the editors of *Industrial and Engineering Chemistry* and the *Electrical World*. It has been suggested that employers, although they are not entirely free to adjust salaries and wages, can make adjustments sometimes with and sometimes without government approval. The technical and scientific men in the rubber industry would undoubtedly prefer to retain their full professional status if given proper recognition in this matter, but the remedy for this situation is entirely up to management. Directors of research, plant managers, etc., are often best able to explain to management the great importance of maintaining the essential individual efforts of these workers.

What the Rubber Chemists Are Doing

Vila before Ontario Group

A MEETING of the Ontario Rubber Group, Canadian Chemical Association, was held at the University of Toronto, Toronto, Ont., Canada, February 3. About 85 members and guests heard George R. Vila, of the synthetic rubber division of the United States Rubber Co., talk on "The Replacement of Natural Rubber with GR-S." A dinner which preceded the meeting was held at Hart House and attended by 62 persons.

Mr. Vila in his talk first pointed out the essential differences between the stress-strain curves of natural rubber and GR-S. It was explained that these differences were mostly due to the failure of the GR-S to develop crystallinity upon stretching. The effect of carbon black and other fillers in reenforcing GR-S was discussed, and the importance of good dispersion emphasized. Vulcanization with various types of accelerators and their effect on green and aged physical properties was covered in detail. It was mentioned that GR-S polymers break down at different rates and show different changes in viscosity on mixing. The advantages and disadvantages of hot break down were described, and it was stated that the addition of para phenylene diamine to GR-S stocks protects the polymer against the effects of hot breakdown although it retards the rate of breakdown. The talk was well illustrated with a number of slides which dealt with outstanding characteristics of GR-S, and Mr. Vila answered a number of questions from members of the audience at the conclusion of his discussion.

Specifications for GR-S Effective January 1, 1944

IN A memorandum under the date of December 18, 1943, to operators of GR-S plants, the Rubber Reserve Co. released the specifications for GR-S to become effective on January 1, 1944, and directed attention to changes from the specifications now in effect.[1] These changes were listed as follows:

1. The small rotor for compounded viscosity has been eliminated.
2. The method for heat loss has been replaced by a mill method for volatile matter. This requires a change in sampling procedure.
3. The size of sample for ash determination has been changed to from three to five grams.
4. The mill roll temperature during mixing has been changed. Mill rolls are to be maintained between 110° and 130° F. throughout the mixing procedure.
5. The milling and mixing procedure has been changed. Instructions for adding carbon black, the changes in the time of aging required, and the weight limits of the slabs to be cured should be noted.
6. The aging of the cured specimens has been changed.
7. All chemical tests except volatile matter are calculated on a dry basis.

A copy of the complete new GR-S specifications incorporating the above changes may be obtained from the Rubber Reserve Co., Normandy Bldg., Washington, D. C., by addressing Dr. H. F. Palmer.

[1] See INDIA RUBBER WORLD, Jan., 1944, p. 375.

Toxicity of GR-S, GR-M, and GR-I

A MEMORANDUM from H. E. Simmons, of the Office of the Rubber Director, under the date of February 4 to consumers of synthetic rubber presents an interim report of the Federal Security Agency, Food and Drug Administration, Division of Pharmacology, on chronic toxicity and irritation experiments using general-purpose synthetic rubbers being conducted by this agency.

This report states under "Conclusions": "Because of the absence of any toxic signs in feeding to rats, the absence of irritation to both intact and abraded skin of rabbits, and the failure to produce foreign body reaction on subcutaneous implantation in guinea pigs with these synthetic rubbers, and provided that no evidence to the contrary develops as we continue our experiments, these synthetic rubbers may be deemed safe for use in seals for food containers, in surgical goods, and in comparable applications where synthetic rubber is not altered in composition."

The point of toxicity of antioxidants is also mentioned in the report. The Federal Security Agency suggests caution in the use of phenyl beta naphthylamine as an antioxidant in rubber used with food containers. The agency states that it is known that beta naphthylamine can cause bladder tumors, and although it has no information that phenyl beta naphthylamine has the same property, criticism and comment can be avoided if one objects to the use of rubber containing phenyl beta naphthylamine.

The memorandum concludes: "The Office of the Rubber Director and the Food and Drug Administration are endeavoring to obtain the best information possible concerning the toxicity of general-purpose synthetic rubber. The information is made available from time to time to aid rubber manufacturers in conducting their own experiments. Consequently the entire responsibility for any use of this information in the manufacture of products for sale to the public rests solely with the rubber manufacturer."

SPDX-G Accelerator Announced

A NEW free-flowing type of SPDX has been developed and is known as SPDX-G. It is formed when SPDX is agitated under suitable conditions with a selected mineral oil and consists of small soft granules or pellets. In this form it is free flowing and remains so under usual storage conditions. It is dustless, handles easily, mills into the batch readily, and disperses perfectly. SPDX-G contains 75% of active SPDX and on the dry basis has the same accelerating value as SPDX.

SPDX has the distinct advantage of giving synthetic rubber stocks, such as GR-S, the characteristics of high tensile strength, high elongation, and maintenance of elongation, low heat build-up, and high resilience at both ordinary and elevated temperatures. Owing to the very heavy demand for this material for use in synthetic rubber, regular SPDX cannot be supplied after March 1, 1944, and it will be furnished in granule form only, under the name of SPDX-G. C. P. Hall Co., Akron, O.

Rubber Reserve Circulars 23-24

CIRCULAR No. 23 of the Rubber Reserve Co., Washington, D. C., on the "Distribution of Synthetic Rubber" referred to previous Circulars Nos. 17,[1] 21,[2] and 22[3] on the same subject and states that the "Committee on Specifications for Synthetic Rubbers" organized by Rubber Reserve in conjunction with the Office of the Rubber Director has approved standard specifications for GR-S[4] for the manufacture of GR-S in all government-owned plants; hence all GR-S sold by Rubber Reserve will be on the basis of the aforesaid specifications. Similarly Rubber Reserve Co. and E. I. du Pont de Nemours & Co., Inc., which is operating the government-owned GR-M plant for Rubber Reserve, have agreed upon a standard specification for GR-M which likewise has been approved by the "Specifications Committee", and accordingly all GR-M sold by Rubber Reserve will be on the basis of the aforesaid specifications. Paragraph 32 of Circular No. 17 is therefore amended by adding the following:

"Any and all claims for quality or weight adjustments should be submitted within thirty (30) days from the date of shipment, as indicated on the reverse side of the related 'Synthetic Rubber Purchase Permit.' All adjustments for off-quality will be on the basis of the standard specifications promulgated by Rubber Reserve Co., copies of which may be obtained by written request submitted to the Sales Department, Rubber Reserve Co., Washington 25, D. C."

In submitting claims for quality or weight adjustments, manufacturers should be guided by the provisions of Paragraph 6 of Circular No. 22.

Circular No. 24 referred to the latest Order R-1 of the ORD which removed all restrictions as to the consumption of GR-P (Thiokol" N) and invited manufacturers to submit bids not later than March 1, 1944, for 1,500,000 pounds of this material, at present stored in Akron, O.

[1] INDIA RUBBER WORLD, May, 1943, pp. 169-73.
[2] *Ibid.*, July, 1943, pp. 384-85.
[3] *Ibid.*, Aug., 1943, pp. 484, 488.
[4] *Ibid.*, Jan., 1944, pp. 375-76, 379.

New Use for Wax Rubber Dressing

WAX finishes for rubber goods have found a new and important application in preventing synthetic rubber inner tubes from adhering to the inner sidewall and top of the tire casing. Present practice has been to deposit a liberal quantity of soapstone in the tire casing when inserting synthetic rubber inner tubes into the casings, but this practice has not been entirely satisfactory and, to say the least, was very messy both in putting the tube into the casing and in removing it when necessary. S. C. Johnson & Sons, Inc., Racine, Wis., reports that the use of its clear or black rubber dressing on the inside of the tire casing furnishes a dry wax film lubrication which prevents the tube from adhering to the sidewall of the casing and at the same time, as the firm puts it, "—— the car owner can change a tire and tube without appearing as though he had been working in a flour mill."

Registration for Rubber Division Spring Meeting

Fill in and mail to: Mr. W. J. Geldard, Naugatuck Chemical Division, 1230 Sixth Ave., New York 20, N. Y.

Division of Rubber Chemistry—American Chemical Society

New York City April 26, 27, 28, 1944

ADVANCE REGISTRATION

Print Name ....
Last First Middle

Business Connection: ....

New York Address: ....

Registration Fees: Check One

Member American Chemical Society	$2.00	☐
Chemical Student	$2.00	☐
Visitors (Non-Chemists Only)	$2.00	☐
Visiting Chemists, from Outside United States	$2.00	☐
All Other Chemists	$5.00	☐

The foregoing is correct (Sign here): ....

Inspector's Approval: Fee:

THE Rubber Division of the American Chemical Society will meet in New York, N. Y., on April 26, 27, and 28, with headquarters again at the Hotel Commodore. Papers dealing with the various phases of the science and technology of both natural and synthetic rubbers will be presented at the technical sessions, and with the present-day rapid rate of change of the knowledge and technique of the compounding and processing of synthetic rubber, no one concerned with their use can afford to be absent from this meeting.

It will help the committe in charge and save much time for you if you will fill out the "Advance Registration" form below and mail at once to W. J. Geldard at the address indicated. Do not send your registration fee in advance. Upon arrival at the Division Headquarters you need only go up to the Advance Registration desk—pay the required fee and receive your lapel badge. The requirements for registration have been specified by the officers of the Division. Read carefully and check the correct class of registration.

This advance registration has nothing to do with hotel reservations. Guaranteed hotel reservation for the Commodore have been mailed to all members of the Division, and if you wish hotel rooms, reserve them now by the use of these cards or write to the hotel of your choice. Banquet and luncheon tickets will be on sale at the registration desks during the meeting. Do not ask for reservations for such tickets on this Advance Registration form.

Akron Group's Winter Session

THE winter meeting of the Akron Rubber Group was held at the Portage Hotel in Akron, O., February 4, with 163 members and guests attending. The principal speaker was Louis Hochberg, of the Goodyear Tire & Rubber Co., who gave a very interesting talk in which he related his experiences during a trip to Java before the war, during which he visited the Hawaiian Islands, the Philippines, Japan, Hong Kong, and China. The speaker was in Java as head of a Goodyear factory at the time of the Japanese invasion and escaped with others in a inter-island cattle boat, during the Battle of the Java Sea, to Australia. This boat was the last boat to leave Java before the Japanese gained complete control of the island. Twelve boats leaving earlier were all sunk.

A. E. Sidnell, group chairman, appointed a nominating committee consisting of Curt Harwick, chairman, Bert Taylor, Fred Theiss, and Wm. Whittaker. This committee is to prepare a ballot for the election of officers which will take place at the spring meeting.

Chicago Group Hears Hendricks

THE first meeting of the year of the Chicago Rubber Group was held February 4 in the Morrison Hotel, Chicago, Ill. The technical part of the program consisted of a paper on "Compounding of GR-S for Heat Resistance" by John G. Hendricks, of the National Lead Co. Lt. Henry Penfield, of the U. S. Navy Aviation Cadets Selection Board, provided confidential movies of recent battle actions, which were enjoyed by all present.

Dr. Hendricks in his talk stated that most GR-S vulcanizates are characterized by a pronounced tendency to undergo continuous and irreversible changes in physical properties when subjected to heat. In contrast to the heat deterioration of natural rubber, oxidation seems to be of little importance in the heat aging GR-S. Accelerator activity and the presence of free or loosely bound sulphur appear to be important factors in changes brought about by heat. These observations seem to indicate that either after-vulcanization or continued polymerization or cyclization, or more likely a combination of the two, is in large measure reponsible for the lack of stability of GR-S vulcanizates toward heat.

The speaker stated further that the deterioration of GR-S compounds at elevated temperatures can be greatly reduced by the use of low sulphur levels if the acceleration used is both powerful and efficient. Low sulphur used in conjunction with a combination of a relatively small quantity of FBS[1] litharge, viz., 1.5%, and about 1% of a thiazole, type accelerator gives vulcanizates greatly superior in heat stability. Modulus tends to remain steady for a given cure and to assume a plateau over a wide range of cures. Retention of elongation and tear resistance are greatly improved, and hardness and dynamic properties tend to retain their original values. It was stated that under these compounding conditions, zinc oxide may be used as a modifying agent. At normal sulphur levels zinc oxide contributes heavily toward heat deterioration, but with low sulphur levels zinc oxide content may be utilized to modify modulus, hardness, and dynamic properties to some extent without impairing heat stability. In conclusion it was said that the improvements noted are not attained at the expense of practical operation, but on the contrary these compounds may be adjusted to a wide range of curing rates and temperature and are stable over an extremely wide curing range.

The next meeting of the Chicago Group will be held on March 10 at the Morrison Hotel. S. M. Martin, Jr., will speak on the new "Thiokol" ST, and there will be shown a War Department moving picture entitled "The Battle of Russia."

[1] Fumed for Buna S.

March 31 for New York Group

THE New York Rubber Group will convene March 31 at the Building Trades Club, 2 Park Ave., New York, N. Y., at 6:00 p.m. This dinner-meeting will be devoted to several talks by men prominent in the trade on future developments on combining and processing of natural and synthetic rubber. Reservations should be made with the Group secretary-treasurer, Peter P. Pinto, at *The Rubber Age*, 250 W. 57th St., New York 19, N. Y.

Firestone Night for L. A. Group

THE February 1 meeting of Los Angeles Rubber Group, Inc., held at the Mayfair Hotel, Los Angeles, Calif., attracted 143 members and guests, and the "1944 Year Book" was distributed to those members present. After dinner the meeting was called to order by Chairman A. Pickard, who introduced the guests. Next followed welcoming of the new members and committee reports. Pictures of the Group's outing were shown by T. R. Edkins.

R. E. Hutchinson, chairman of the program committee, conducted the balance of the meeting and presented C. L. Smith, factory manager of the Los Angeles plant of the Firestone Tire & Rubber Co. He in turn introduced the company's guests who

had turned out for Firestone Night, including Leonard K. Firestone, president of the plant. The latter after a brief talk introduced the speaker of the evening, Rufus von KleinSmid, president of the University of Southern California.

His topic was "America in the Postwar World." Some of the main points of his speech were: the United States, contrary to popular belief, had always been a "warring nation"; isolationism is dead; the possibility of a lasting peace is largely dependent on the leadership of the United States and its relations with the other United Nations; and we must be prepared to sacrifice some of our "sovereignty", but not our "ideals" in order to achieve a permanent peace.

Drawings for the various prizes went as follows: the set of 94 pieces of China, donated by Firestone, to C. H. Churchill; the $25 War Bond, contributed by F. H. Banbury, to Murray Nixon; a lounging jacket and two auto robes, also from Firestone, were won, respectively, by W. Boswell, Galen Norton, and T. Kirk Hill.

Northern California Group Meets

THE first monthly meeting for the year 1944 of the Northern California Rubber Group was held January 27 at the Hotel Claremont, Berkeley, Calif. Fifty-five members and guests were present to hear the speaker of the evening, Fernley H. Banbury, explain the operation and application of the Banbury mixer in the present production of GR-S tires and to see an interesting sound picture illustrating war products of the United States Rubber Co. Mr. Banbury, recently retired from Farrel-Birmingham Co., Inc., explained in considerable detail the operation of his mixer with special reference to GR-S tire production and answered many questions on the technique and temperatures of milling procedure.

Messrs. Slate and Gourlie, of U. S. Rubber, next presented the motion picture, which was originally prepared for the War Department and which illustrated the great variety of products that this company is manufacturing for the war program. The picture also showed how the different products were made in the various plants.

Besides the new officers of the Group recorded in our last issue, three new members were elected to the board of directors: John Liljegren, technical superintendent Pioneer Rubber Mills; George Petelin, Compounder, Goodyear Rubber Co.; and Lynn Shafer, prochasing agent, American Rubber Co.

At the conclusion of the meeting a drawing was held for a $25 War Bond, donated by Mr. Banbury. It was won by Kenneth Marple, of Shell Development Co.

Montreal Meeting

A MEETING of the Montreal Rubber & Plastics Division of the Society of Chemical Industry was held February 11 at McGill University, Montreal, P. Q., Canada, with about 85 members and guests attending. The meeting was preceded by a dinner at the Berkeley Hotel. The principal speaker was W. Galley, of the National Research Council, Ottawa, Ont., who talked on "Some New Developments in Plastics."

Dr. Galley divided the plastics into four classes according to use as follows: molding, laminating, coatings, and adhesives, and then spoke briefly on new developments in each of these classes. Urea formaldehyde and phenol formaldehyde were given as examples of thermosetting plastics for molding, and it was stated that polystyrene plastics require much higher temperatures for molding than some of the other plastics of the thermoplastic type. New developments in high frequency heating for molding were discussed, and reference was made to recent work of the speaker in using conductive glue in laminating heavy sections.

The theory of the action of plasticizers was discussed, and Dr. Galley stated that he thought the theory of lubrication—so that particles moved more freely past each other—did not completely account for the action of plasticizers. The elastomer type, such as Norepol, was mentioned and also some of the newer materials under development which give tensiles as high as 3000 p.s.i. and elongations of 600%. The increased use of low pressure lamination was referred to, and the main advantage of high pressure lamination in giving better water resistance pointed out. Phenolic and urea resins were given as examples of the materials used for bonding wood to wood, rubber to metal, wood to metal, etc., and new types being developed have given some interesting results in steel to steel bonding.

The chairman for the meeting was A. B. Lewis, of the British Rubber Corp., who stated that the election of officers for the forthcoming term will be held at the next meeting, scheduled at McGill University on March 10 at which time N. S. Grace of Polymer Corp., Ltd., will speak on "The Manufacture of Synthetic Rubbers in Canada."

CALENDAR

Feb. 28-Mar. 3	A. S. T. M. Spring Meeting and Committee Week. Netherland Plaza, Cincinnati, O.
Feb. 28-Mar. 11.	National Labor-Management Exposition. Department of Commerce Auditorium, Washington, D. C.
Mar. 1-31	Red Cross 1944 War Fund.
Mar. 7.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Mar. 10.	New York Section, A. C. S. Nichols Medal Award.
Mar. 10.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Mar. 10.	Rubber & Plastics Division, Montreal Section, S. C. I. McGill University, Montreal, P. Q., Canada.
Mar. 14.	Detroit Rubber & Plastics Group.
Mar. 14-15.	National Association of Waste Material Dealers, Inc. Thirty-First Annual Convention and War Conference. Hotel Astor, New York, N. Y.
Mar. 24.	Rhode Island Rubber Club. Spring Meeting. Crown Hotel, Providence, R. I.
Mar. 28-30	American Management Association. Packaging Conference. Palmer House, Chicago, Ill.
Mar. 31.	New York Rubber Group. Building Trades Club, 2 Park Ave., New York, N. Y.
Apr. 1.	Rubber & Plastics Division, Montreal Section, S. C. I. Joint Meeting with Montreal Paint & Varnish Production Club. Queen's Hotel, Montreal, P. Q., Canada.
Apr. 4.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Apr. 14.	Boston Rubber Group. Hotel Statler, Boston, Mass.
Apr. 26-28.	Division of Rubber Chemistry, A. C. S. Spring Meeting. Hotel Commodore, New York, N. Y.
June 26-30.	A. S. T. M. Annual Meeting Waldorf-Astoria Hotel, New York, N. Y.

Circosol-2XH Elasticator for GR-S

A NEW softener and plasticizer, which because of its ability to give GR-S stocks with improved resilience and lower heat generation than some of the currently available materials of this type, according to the producers of this new compounding ingredient, and therefore should be especially useful in developing the pertinent qualities sought for in GR-S compounds, has been announced. This product, Circosol-2XH, is called an elasticator because of its peculiarly effective action on GR-S. It is a petroleum hydrocarbon in the form of a heavy viscous liquid, clear, transparent, and with a pale green color as observed by transmitted light. Composed of hydrocarbons of comparatively high molecular weight, its low volatility precludes any fuming and losses during mixing in the Banbury or processing on mills.

In a GR-S tire carcass-type compound, employing semi-reenforcing furnace black, Circosol-2XH in comparison with refined pine gum had a rebound value with the Goodyear-Healey type of tester of 69 against 64, and a heat build-up 10 to 20° F. lower, when tested both at constant load and constant deformation. GR-S tread-type compounds containing easy-processing channel black and using Circosol-2XH in comparison with a mixture of coal-tar products and pine-tar products, also showed better resilience and less heat build-up. The differences, although small, were in the right direction. GR-S tread-type compounds employing fine furnace black and containing Circosol-2XH in comparison with a combination of paving asphalt and a medium grade of pine tar are characterized by better resilience. In GR-S tread-type compounds containing high loadings of fine furnace black, several representative types of softeners, when compared with Circosol-2XH, gave lower rebound and higher heat build-up values. Sun Oil Co., Philadelphia, Pa.

UNITED STATES

Some Synthetic Plants Found to Require Improvement; New Rubber Agreement with Brazil

It was announced February 9 by the Rubber Development Corp. in Washington and by Valentim F. Boucas, special representative of the Brazilian Government, in New York, that as a result of conversations of Dr. Boucas with Douglas H. Allen, president of the Rubber Development Corp., a supplemental agreement between Brazil and the United States had been reached which provides for the payment by the Rubber Development Corp. of a premium of 33⅓% over the prices for natural rubber established early in 1942 in the agreements between Brazil and the United States. The premium, which will amount to 15¢ a pound for the basic grade of Acre fine, washed and dried, the previous price for which was 45¢ a pound, will be payable on all rubber received by Rubber Development from Brazil during the period February 9, 1944, to March 31, 1945. Increased production costs and providing an incentive for maximum production are the reasons given for payment of the premium.

The Government of Brazil has agreed to assume all future development expense in Brazil and is making immediately available $500,000 to finance the new production organization. Brazil will also relieve Rubber Development of "certain obligations which the corporation had assumed in order to stabilize production costs in the Amazon." As a result, the personnel of Rubber Development in Brazil will undoubtedly be reduced, but its inspectors will of necessity remain and carry on their duties as usual, and many experts on tapping, collection, and other aspects of production will remain in the field as technical consultants.

"We have been sending 70% of Brazil's rubber production to the United States since 1942," Dr. Boucas said in his statement, "and we intend to expand rubber production and hope to eventually produce about 100,000 tons for export to the United States. For protection, however, we would like to seek a guarantee to supply the United States with 10% of its rubber needs."

No decisions have been made public regarding the disposal of the large amount of equipment rushed to Brazil early in the war in the form of boats, docks, warehouses, hospitals, housing, etc. Whether it will be retained in Brazil or shipped back to the United States, and if retained, how payment will be made, has still to be decided. It has been stated that studies are being made by representatives of the Rubber Development Corp. in other countries of Latin America which produce wild rubber to determine whether or not costs of production in those countries have likewise risen to a point requiring the payment of some premium in price to assure maximum production.

Synthetic Plant Production Status

Rubber Director Bradley Dewey stated on February 9 that the production of government synthetic rubber during January, 1944, amounted to almost 50,000 long tons and that production for the first quarter of 1944 should equal the estimate made October 31, 1943, of 166,300 long tons. The Rubber Director reported further that all copolymer, styrene, and neoprene plants are completed and in operation. One small butyl plant is completed and is being charged with feed stock; a second is substantially completed for one-half of its ultimate capacity, while a third plant of 30,000-ton capacity, because of low priorities, will not be completed until June. In the butadiene program all the alcohol plants are completed, but owing to lesser priorities there remain some butadiene-from-petroleum plants still to be completed. Modifications and additions to butadiene-from-petroleum plants found necessary from the operation of the early plants of this type and the pressure for completion of aviation gasoline plants which required the same labor facilities have added to the delay in finishing the construction of some of the petroleum-butadiene plants. Consequently about 75% of the butadiene now being produced is coming from the alcohol butadiene plants which fortunately are producing at 150% of capacity. As more of the petroleum-butadiene plants get into production, the ratio of the production of butadiene-from-alcohol to butadiene-from-petroleum will change and level out at about 55% from petroleum and 45% from alcohol, according from present estimates.

In commenting on the relation between plant construction and operation, Colonel Dewey stated that according to the original estimates, the first alcohol butadiene plant should have made 60% of its rated capacity during the first five months of operation; while, actually, it did better than the original estimate and produced 95% of rated capacity during this period. Subsequent units profited from the experience of the first unit, and in some cases plants produced at better than rated capacity in the first month of operation. The first and basic plant using the so-called Jersey dehydro process for producing butadiene from petroleum also was scheduled to produce at 60% of rated capacity during the first five months and actually made 110% of capacity during the "breaking in" period and is currently producing at upwards of 125% of rated capacity. Finally it was pointed out that the petroleum plants are still too young to be expected to carry much more than their present proportion of the load, and the fact that they are too young is due to their having been late in building—not to inherent inoperability of the processes. The exceptions to the last point are a few minor plants built with too much second-hand equipment, and it can be safely said that one of the lessons that these have taught is that plants for the carrying out of intricate hydrocarbon chemistry should not be built with second-hand junk and that the equipment must be designed for the process rather than the process built around equipment, the Rubber Director concluded.

Tire Production Outlook

The production of heavy-duty military, truck, and bus tires is and for some time to come will be limited by available tire-making facilities as well as rayon cord, the Rubber Director also stated. There is an unfilled gap between the requirements of the military and current production of heavy-duty combat airplane and other military tires, and this will continue for some time. The shortage of truck and bus tires is even more severe, and great efforts are being made to close the gap so that only a minimum of essential transport might have to be curtailed. Valuable priority help is being received, and the military services and the ODT are constantly reviewing their requirements and developing their conservation programs.

Production of passenger-car tires is being held down to about one million tires a month in order to conserve GR-S and tire cord for important military and essential civilian bus and truck tires. Only three-quarters of these passenger-car tires are being distributed and rationed since the remainder are being stockpiled against any possible emergency in supply. No increase in production is possible until the latter part of the year, and the total available for rationing for 1944 is now estimated as between 18 and 24 million tires. Although this falls short of the 30 million tires previously estimated, there need be no curtailment of essential driving so far as tires are concerned if the public continues to cooperate and take care of its tire and recap as often as needed, the Rubber Director said.

The Neoprene Situation

Because of its special properties neoprene, the first general-purpose synthetic rubber to come into quantity production, is essential for many military products, and military requirements for neoprene have increased to the point where a month ago military demands forced a curtailment for civilian use. Elastic yarn and thread manufacturers who have been using neoprene now have to acquire the "know how" to make their products from GR-S or some other synthetic or substitute. Reports from rubber thread manufacturers indicate that work is going forward night and day, but most of the companies have not been able as yet to produce a satisfactory thread for civilian use. The poor heat and fatigue resistance of rubber thread made from GR-S makes the outlook for a large amount of development work before any appreciable production can be contemplated, quite definite.

Improvements for Synthetic Plants

The Rubber Director announced February 17 that $30,000,000 worth of improvements are to be made in plants producing synthetic rubber and its raw materials during 1944. These projects are in no sense an expansion of the synthetic rubber program, but are designed to put into effect minor changes and additions in order to bring about more efficient operation of some of the plants. Highest priorities have been granted to all of this scheduled construction and installation. It is inevitable that certain changes and modifications would become apparent as experience was gained in producing synthetic rubber on a scale never before attempted in this country, while a sizable amount of money unfortunately must now be spent in replacing inadequate used equipment installed in some of these plants.

Three million dollars has been allocated to improve alcohol-butadiene facilities, and $10,000,000 will be used for the petroleum-butadiene plants. Styrene plants will receive $3,000,000, and the copolymer plants will get $10,000,000 to improve their operation. Three million dollars of the 1944 expenditure will be used to aid the plants to make Butyl rubber, and one million dollars is scheduled for use for miscellaneous improvements to the various divisions of the synthetic program.

Along these lines it is reported that tentative plans have been prepared for a plant to produce alcohol for butadiene from wood pulp waste, using the process sponsored by the *Chicago Tribune* and developed at

Thorold, Ont., Canada. The Rubber Director and other government officials took part in the dedication of the world's largest single-unit grain alcohol plant at Omaha, Nebr., February 21 and then were present at the dedication of the world's largest petroleum butadiene plant at Port Neches, Tex., on February 23. The alcohol plant was built during the past year by the Farm Crops Processing Corp. of Nebraska. It was financed by the Defense Plant Corp. and sponsored by the WPB. Its entire output of 17,500,000 gallons of grain alcohol a year will be taken for the duration by the Defense Supplies Corp. for the production of synthetic rubber, explosives, and other war needs.

The Port Neches petroleum butadiene plant, which has a rated capacity of 100,000 tons of butadiene yearly, started operations in one half of the plant in January. Designed and built by five major oil companies for the Defense Plant Corp., this installation is identified by its fractionating towers which are 175 feet in height and 14 feet in diameter and number 48 in all and its 42 pressure spheres or storage tanks (largest group in the history of oil refining).

House Agrees to Resolution on Guayule

The House of Representatives on February 15 agreed to a resolution of Congressman Anderson of California that the Committee on Agriculture should make a full and complete investigation of the progress of the program provided for in the act of March 5, 1942 for the planting of guayule to serve as a domestic source of crude rubber, with a view to determining whether such program is being carried forward in a manner calculated to achieve such source in the shortest possible time. A long statement addressed to Governor Warren of California by Fred J. Hart, chairman of the State Guayule Committee of California, which reviewed the present and future status of the guayule project, was also read into the *Congressional Record*.

J. E. Hutchman, formerly head of the now abandoned Specialty Synthetic Rubber Branch of the Office of the Rubber Director, resigned about the first of the year and has again taken up his private consulting work. His present address is 347 Glen Circle, Decatur, Ga.

Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., through General Manager Harry E. Smith has announced that effective February 14, James E. Skane returned to the Manhattan organization after many months of full-time service in the Office of the Rubber Director, Washington, D. C. As long as necessary, however, Mr. Skane will spend a few days of every fortnight in Washington in an advisory capacity to the ORD. Mr. Skane's activities in the Manhattan organization include taking over the handling of the company's allocations of crude and synthetic rubber and the reporting and detail connected therewith, and contracts and consultations with customers in respect to the problems attendant to conversion of special products from crude to synthetic rubbers.

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., through E. T. Asplundh, vice president in charge of the Columbia chemical division, has reported that Dwight R. Means, with the division for 21 years, has been made assistant to the vice president. Prior to his new appointment Mr. Means was technical director and had previously served as research director and assistant superintendent.

Postwar Planning Booklets

As an aid to company executives in their postwar planning, the National Association of Manufacturers, 14 W. 49th St., New York 20, N. Y., has prepared a series of guide booklets covering various phases of preparatory work and produced by the Corporation Peacetime Planning Committee of the Association. The first two booklets have already appeared.

The first booklet, "Guide to Internal Organization for Corporation Postwar Planning", is offered as a summary of the experiences of more than 350 representative manufacturing companies and suggests a step-by-step program of action.

"Guide to Postwar Sales Planning", the second booklet, attacks such problems as the building or rebuilding of a distributer organization, the building of a sales story about wholly new products, and hiring and training a new sales staff.

The remaining three publications of the series are to appear shortly under the titles of "Guide to Postwar Product Development", "Guide to Cost Study in Corporation Postwar Planning", and "Guide to Postwar Corporate Financial Planning."

Growth of the North American Philips Co.

In welcoming visiting editors to the opening of the company's showroom at 100 E. 42nd St., New York, N. Y., Pieter van den Berg, vice president and general manager of North American Philips Co., Inc., speaking for President P. F. S. Otten, announced the establishment of a new electronics research laboratory at Irvington, N. Y., and the appointment of Ora Stanley Duffendack, professor of physics at the University of Michigan, as research director. He also reviewed the company's war production accomplishments and told of plans for postwar industrial electronics development.

The company's three plants at Dobbs Ferry and Mount Vernon, both in N. Y., and Lewiston, Me., all on war work, are now producing quartz oscillator plates, cathode ray tubes, X-ray equipment and tubes, fine wire, tungsten and molybdenum products, and other electronic devices. Speaking of the company's wartime accomplishments and postwar plans, Mr. van den Berg said:

"By comparison with other companies in the electronics field, we have a relatively small staff, but the per capita output of our plants and the quality of our products have won for us the commendation of many high government officials, of which we are very proud. . . .

"Our present setup in research, development and manufacturing is the sound core around which we will build. Let me emphasize that North American Philips is and always will be an American company. It will not be dependent on help from outsiders in its development. It plans to stand on its own feet. After the war, we will have a great asset in that we will be able to draw upon the tremendous technical resources of Philips companies in Holland and in other countries.

"The original Dutch company was founded in 1891 by Dr. A. F. Philips, who is now in this country, and his brother. In the years before the war, the factories at Eindhoven covered 78 acres and employed 20,000 people. The scientific laboratories employed a staff of over 1,000 and covered nearly 4 acres. In 1939 there were another 20,000 people in Philips factories in other parts of the world. Right now the factories in England employ between 10,000 and 20,000 workers on war production.

"Many editors throughout the world became acquainted with Philips' research and scientific developments through the pages of *Philips Technical Review*, which at the time of the invasion of Holland was printed in four different languages."

North American Philips Co., Inc., was incorporated under Delaware laws in January, 1942. All its stock is held by the Hartford National Bank & Trust Co., Hartford, Conn., acting as trustee under an indenture dated August 25, 1939, with N. V. Philips Gloeilampenfabrieken (Philips Incandescent Lamp Works Company) et al, formerly of Eindhoven, Holland, and now of Willemstad, Curacao, Netherlands West Indies. The North American company was formed by Philips interests in the United States in order to make full use in the war effort of all the resources available to them—management and engineering personnel, technical knowledge, and funds. A group of executives and engineers from Philips Holland came to the United States when their country was invaded. Others drawn from the Philips organization in allied and neutral countries have added their skill and knowledge to that of the American members of the company's staff.

"Current Export Bulletin No. 145", issued February 5 by the Foreign Economic Administration, Bureau of Supplies, Requirements & Supply Branch, Washington, D. C., contains a clarification of "Current Export Bulletin No. 137", which covered a modification of the decentralization procedure effective January 1. Among the items affected are: naval stores, gums, and resins; chemical specialties, coal-tar products; industrial chemicals; pigments, paints, and varnishes; rubber hospital sheeting; rubber gloves and mittens; water bottles and fountain syringes; other rubber druggists' sundries, including dental rubber goods; elastic webbing; and suspensories and supports.

"Current Export Bulletin No. 147", February 16, gives instructions to exporters of automotive replacement and repair parts, including insulated copper cables, rubber covered high-tension wire, and tire valves.

R. D. Young, vice president of the Rubber Reserve Co., Washington, D. C., resigned on February 1 to become president of the Rubber Trade Association of New York, 15 William St., New York 5, N. Y. Mr. Young will continue to serve the Rubber Reserve Co. in an advisory capacity, dividing his time between New York and Washington for the present. The directorate of the Association also announced the election of G. LeRoy Scheinler, of Robert Badinhop Corp., to the new post of chairman of the board.

Hercules Powder Co., Wilmington, Del., through A. E. Forster, general manager of the naval stores department, has announced that A. H. Reu, acting plant manager of the company's Brunswick, Ga., naval stores plant since 1940, has been named manager, succeeding R. Rockwell, who went in 1940 to Chattanooga, Tenn., as Hercules plant manager of Volunteer Ordnance Works.

Pennsylvania Rubber Co., Jeannette, Pa., according to R. B. Cave, sales manager, has made R. L. Taylor technical adviser for the company in eastern Pennsylvania and southern New Jersey.

OPA Sets New Ceilings; Other Price Revisions

Specific dollars-and-cents ceilings for the basic types of tire and tube repair materials were established in RMPR 131—Camelback and Tire and Tube Repair Materials—effective February 3 in the United States and March 20 in its territories and possessions. Simultaneously OPA removed tire and tube repair materials from MPR 220—Certain Rubber Commodities (Amendment 14, effective February 3), and brought them under a revision of the camelback regulation. Manufacturers and any other sellers of these products to recappers, vulcanizers, and retailers are covered by these ceilings. The general level of ceiling prices, however, is not changed. Previously these sellers had either "freeze" or formula price ceilings, and any inequalities that occurred are ironed out.

Some of the basic types of repair materials affected are tire repair cushion stock, tread repair stock, tube repair gum, vulcanizing cement and cold cure cement. Types of repair material other than those specifically listed have ceilings based on a formula similar to that formerly used, but improved so as to provide a more workable method of pricing these commodities. Again, the general level of prices is not changed.

Camelback ceilings remain the same under the revised regulation except that two new classifications are added, with their ceilings based on normal differentials in the industry. They are base stock and lug stock. On base stock the new ceilings are 36¢ a pound for Grade A camelback, and 31¢ a pound for Grade C camelback in 6/32-inch gage. In 5/32-inch gage the respective ceilings are 31¢ and 26¢ a pound. Lug stock ceilings are 34¢ for Grade A camelback and 29¢ for Grade C. These ceilings apply to all sales by any seller to recappers and vulcanizers. On sales by manufacturers to jobbers, the same discounts granted in June, 1943, must be continued. Previously the regulation had covered only sales of camelback by manufacturers. Jobbers previously were under the General Maximum Price Regulation. Their ceilings remain unchanged under the revised regulation.

The revised regulation will not cover sales of camelback and tire and tube repair materials to the United States Government or any of its agencies. These sales are transferred to MPR 403—Certain Rubber Commodities Purchased for Governmental Use—(Amendment 6, effective February 3). Under that regulation, April, 1943, is the base period for determining price ceilings. This change has been made because that base date has been found more appropriate for determining ceilings of many rubber commodities sold to the government.

Mechanical boat cloth—the cloth of which certain life jackets and the boats that can be inflated in water are made—are given a cents-per-yard ceiling price under Amendment 13 to MPR 11—Fine Cotton Goods—effective February 11. Five additional constructions of fine cotton cloth are also included: poplin used in wind breakers; fine combed plain cloth for small gears for electric motors, etc.; printer's blanket cloth used as a cushion in printing; and two classes of carrier apron for rubber thread used as an absorbent to protect the thread from heat. Previously these cloths were normally subject to prices on cents-per-pound basis lower than the level of the specific prices contained in the regulation. The setting of cents-per-yard prices, higher than the poundage of figures, follows a regular procedure whereby producers may request prices for unlisted constructions in line with specific yardage prices established for other constructions. The new prices are added to Table I in the regulation under their appropriate headings. A "Mechanical Boat Cloth" heading is added to MPR 11.

Maximum wholesale prices for tractor tires and tubes when sold to a new class of purchaser, or by a new seller, were upped by Amendment 9 to MPR 143—Wholesale Prices for New Rubber Tires and Tubes—effective February 14, but there will be no increase at retail. New ceilings will be determined by applying a uniform discount of 22½% to the maximum retail price of the tire or tube. Previously the discounts allowed were 25% for tires and 30% for tubes, the discounts permitted for tires and tubes other than for tractors. The new rate will cause slightly higher prices at wholesale on these tractor sales. The change was made to conform with general industry practice of extending somewhat smaller discounts on tractor tires and tubes than on regular passenger-car, truck, and bus tires and tubes.

The amendment further provides that a brand owner whose maximum wholesale prices for new natural and synthetic rubber tires and tubes are out of line with the general level may apply for an adjustment in his ceilings. Wholesale ceilings for these brand owners are established on the basis of discounts allowed in March, 1942. Certain manufacturers were frozen to extremely large discounts in effect in that base month, which are substantially out of line with the discount structure of the industry generally. By permitting such manufacturers to apply for a new discount schedule, part of the pressure these manufacturers are experiencing from increased costs will be relieved. On the other hand distributors who buy from these manufacturers will not be "squeezed" as they will in any event receive margin at least as large as those received by distributers generally.

Order 1 (February 12) to MPR 229—Certain Rubber Footwear—rules that all wholesalers may sell or deliver to retailers and retailers may buy or receive men's molded sandals, men's molded clogs, and women's molded footholds at prices to be adjusted upward in accordance with any action that may hereafter be taken by the OPA charging the applicable maximum price for wholesalers' sales to retailers. Unless and until the OPA changes the maximum prices applicable to such footwear, no retailer may pay and no wholesaler may receive for such footwear more than the ceilings presently established by MPR 229.

New dollar-and-cents retail ceilings for waterproof rubber footwear—rubbers, arctics, gaiters, and rubber boots—appear in RMPR 229—Retail and Wholesale Prices for Certain Rubber Footwear—effective February 24. This footwear has been produced in recent months with an increasing substitution of synthetic for crude rubber and with reduced amounts of reclaimed rubber as compared with the Victory Line footwear manufactured immediately after the outbreak of war. Because of demonstrated increased costs for this new type of rubber footwear, manufacturers and wholesalers were permitted to increase their maximum prices on January 26, 1944, by approximately 9% over the Victory Line ceilings. The new retail ceilings established reflect the actual dollar-and-cents increase in cost to the retailer and represent an average increase of 6½% over the maximum dollar-and-cent prices allowed on the Victory Line footwear.

For these higher prices, the public will receive rubber footwear that will more nearly approach the wearing quality of pre-Pearl Harbor footwear than did the Victory Line product, OPA said.

Five groups of ceilings are provided for different classes of retailers, depending on the discounts they receive from manufacturers and wholesalers. A simplified table is provided, enabling a retailer quickly to determine his ceiling on any type of waterproof rubber footwear. This increase in retail ceilings is the minimum required by law and is necessary to assure the retailer adequate margins over his increased costs.

This revision of MPR 229 followed consultation with the industry, which generally has approved it. The revised regulation provides that if a retailer is able to buy at a lower net price because of increased purchases, he must redetermine the price class to which he belongs. He must then take the ceilings of his new price class. This requirement has been added so that any savings through quantity purchases will be passed on to the consumer. The former regulation is also simplified by the revision.

Ceilings established January 26, 1944, for canvas-topped rubber-soled shoes of vulcanized construction are incorporated in RMPR 229.

A summary of the rubber footwear regulation, including all the new ceilings for canvas and waterproof rubber footwear, will be distributed by rubber footwear manufacturers and wholesalers to their retail customers. These summaries, supplied by OPA, will also be available at OPA local offices.

Changes in Other Price Rulings

Amendment 7, MPR 403, effective February 5, decrees that manufacturers of certain rubber commodities purchased for government use need no longer file maximum price reports in connection with experimental production and small orders, in an OPA simplification of the reporting provisions of the regulation covering these commodities, which include a long list of such varied items as wearing apparel, lifebuoys and parachute parts and equipment, made in whole or in part of rubber and bought for government use. The amendment requires manufacturers affected by the regulation to make reports of maximum prices only when orders have been received for more than one unit and total sales reach $1,000. A clarification also specifies that covers, as engine covers, not mentioned in the original regulation, are subject to its provisions, as are tarpaulins. While the volume of reports is now reduced, there is no change in the forms used or in the manner of their filing. Procedure for correction of maximum prices not properly computed and for adjustment of those not in line with the level of ceilings established by the regulation also remains unchanged.

Manufacturers of new bicycle tires or tubes are permitted under Amendment 3 to MPR 435—New Bicycle Tires and Tubes—effective February 1, to seek adjustment of their ceiling prices if these impede or threaten to impede production. Applications for adjustment, to be filed with OPA's Washington, D. C., office, must show: (1) that the applicant is an essential producer, (2) how the existing maximum prices are impeding or threatening to impede production, (3) the amount of relief desired, and (4) facts justifying the granting of that relief.

At the same time OPA made clear which price regulations apply to sales of imported bicycle tires and tubes. Brands of these imported products must be listed specifically in an appendix to MPR 435 to be covered by it. Any unlisted imported tires and tubes come under GMPR and the Maximum Import Regulation.

The base period for determining ceilings of those coated and combined fabrics used for combat vehicles or military airplanes has been switched from March, 1942, to April, 1943, under Amendment 2 to MPR 478—Coated and Combined Fabrics—effective February 5. The change also applies to services rendered on these fabrics. The April, 1943, base period already applied to those fabrics or services sold directly to the government, and the new amendment reflects the original intention of OPA to establish such a base period for all military coated and combined fabrics.

A coated fabric is any knitted or woven fabric coated with a continuous film such as rubber, synthetic rubber, pyroxylin, cellulose ether, or ester, synthetic resin or oxidizable oil, the most of which are utilized for waterproofing. Coated fabrics also include oilcloth, book cloth, and artificial leather made from non-woven fibrous products. A combined fabric is one in which two or more fabrics are joined together with an adhesive.

In March, 1942, many of the coated and combined fabrics since perfected were in experimental production only. Since then numerous changes have occurred in their specifications, and the use of a March, 1942, base period for pricing these fabrics and services would require manufacturers using a formula in determining maximum prices. The April, 1943, base period relieves the manufacturer of this burden inasmuch as he can readily compare fabrics now being produced with similar ones fabricated last April.

OPA also changed MPR 478 to clarify the fact that the same person may be a manufacturer of some fabrics and a wholesaler of others, depending upon the function he performs with respect to the fabric in question. This interpretation has been placed on the regulation consistently in the past. Under the regulation a manufacturer of coated or combined materials is any producer, converter, job coater or job combiner. A wholesaler is a person who sells coated or combined fabrics to resellers or to an industrial or commercial user, the United States, any other government, any of its political subdivision, or any agency of any of the foregoing.

MPR 136—Machines and Parts and Machinery Services—by Amendment 107, effective February 11, underwent several changes, including revisions in the wording of some provisions of the regulation to assist the machinery industry in determining its coverage. Thus, mentioned was rubber tire and tube machinery which has been consistently interpreted as including tire recapping and retreading molds and accessory parts, tire buffers and spreaders, and spot vulcanizers for tubes. OPA now specifically includes these items as rubber tire and tube machinery.

Rationing Regulations Changes

Amendment 5 to RO 6A—Men's Rubber Boots and Rubber Work Shoes—covers deliveries to ships' stores. Under the sixth amendment, effective January 29, individual retailers and jobbers of such footwear may sell limited quantities of excess stocks ration-free on authorization from OPA district offices, and the released rubber footwear must be marked with official "non-rationed" stickers before it is sold. Such action, however, is not a general release from rationing and does not indicate an improvement in the total supply of rationed rubber footwear available for civilian workers. But dealers have found that some types of stock have not sold well under rationing in some areas, and the new plan, evolved with the assistance of the trade, will enable dealers to move these stocks, which might otherwise be wasted through deterioration. OPA further explained that the release must be handled individually for each dealer because the problem of excess stocks differs in different localities.

Further changes have been made lately in RO 1A—Tires, Tubes, Recapping, and Camelback. Thus, the purpose for which a person drives his automobile, rather than the distance he drives it in a given month, determines his eligibility for passenger-car tires, according to Amendment 67, effective February 1. This shift from a mileage to an occupational basis was necessitated by the serious depletion of the supply of used passenger tires available for rationing to low-mileage drivers, coupled with inadequate stocks of new tires. Now any person who drives his car in connection with a highly essential occupation, regardless of his gasoline ration, may apply for a ration certificate good for buying a Grade I tire, or, if such a tire is unavailable, he may secure a certificate for a Grade III tire. The remaining supply of Grade III tires will go to persons doing occupational driving of a less essential character. Drivers doing work most essential to the war effort, the public health, and safety come first.

OPA summarized as follows the tire supply situation calling for the change. About a million and a half used passenger tires are left for rationing. Since such tires have recently been rationed at the rate of about 850,000 a month, it is no longer possible to continue the old program and still keep essential cars in operation. The ORD has advised OPA that because of heavy military needs, together with shortages of essential materials, equipment, and manpower, manufacture of new passenger tires during the present quarter will not permit a national monthly quota in excess of 750,000. This figure is not large enough to give all occupational drivers new tires as needed.

Essential truck operators in areas where tire recapping facilities are inadequate or unavailable may obtain a ration certificate permitting them to exchange with dealers a tire which needs recapping for a used tire or a new "war" tire. Under Amendment 68, which also contains two other changes: (1) Tire dealers had through February 29 to request the return of Parts B (the stock replenishment portion of a tire rationing certificate) which they turned into their OPA District Office in "payment" for increased tire stocks they were allowed to acquire last summer. On November 11, 1943, dealers who had not turned in these certificates were permitted to keep them and thereby maintain larger working inventories so as to be in a better position to serve eligible consumers. At that time OPA also provided that those dealers who had already turned in their Parts B could request their return from the district offices. After February 29 all outstanding Parts B probably will be destroyed. (2) Passenger cars operating as commercial motor vehicles and used exclusively to transport persons at funerals are now eligible for new tires (List "A" eligibility).

To facilitate the flow of the limited stocks of new passenger tires and tubes from wholesalers to retailers and thereby meet consumer demand with as little delay as possible, Amendment 69, effective February 19, provides for an increase in wholesaler's inventories of these tires and tubes. Increases in retailer inventories cannot be granted, however, until such time as synthetic tire production reaches sufficient volume to justify this action. It is not expected that this will be in the immediate future. OPA explained that up to the present, wholesalers, in many cases, have had to operate on very limited inventories. Early in 1942 many of these dealers returned substantial portions of their inventories under the Tire Return Plan to reduce their stocks in proportion to the reduced demand under tire rationing. As the number of tires released each month for essential civilian needs has increased, these working inventories have proved inadequate to fill the demands of their wholesale business.

Amendment 3 to RO 1B—Mileage Rationing: Tire Regulations for Puerto Rico—relates to grades of camelback and allotments to recappers. The next amendment, effective January 31, pertains to availability of Grade I truck-type tires. Amendment 5, effective February 17, covers condition of eligible vehicle and temporary transfer, mounting, and use of used tires not capable of being recapped.

Amendment 5, RO 1E—Mileage Rationing: Tire Regulations for the Territory of Hawaii—treats of eligibility for a Grade I tire to replace a tire or tube that cannot be repaired or recapped.

Amendment 102 to RO 5C—Mileage Rationing: Gasoline Regulations — effective February 7, decrees that motorists must present their tire inspection records when applying for special gasoline rations for use when moving to a new residence or for other special circumstances.

War Department, Washington, D. C., recently announced a new combat boot designed to replace the shoe-and-legging combination in fighting areas. The new boot, which has a five-inch leather cuff at the top fastened with two buckles in order to provide increased air circulation and greater comfort, has a full synthetic rubber sole and heel and laces up to the ankle. The cuff is lined with canvas to conserve leather and afford a good holding surface for trousers tucked into the top of the boot. In this new footwear the flesh side of the leather is on the outside, permitting the grain or smooth side of the leather to be worn against the soldier's foot for greater comfort. A survey by the Army further reveals that the American soldier requires less shoes a year than formerly and in certain cases gets even less than a civilian does under rationing. This reduction in Army footwear requirements is attributed to improved methods of tanning the upper leather from which the shoes are made and also to the longer life of the synthetic rubber sole and heel.

United States Department of Agriculture. War Food Administration, Washington, D. C., has announced that industrial consumers of rationed fats and oils apply to the WFA for ration certificates after February 1 on printed form FDA-695 instead of by letter. There are no changes in the kind of information to be supplied by applicants, but the new form should simplify the procedure both from the standpoint of the applicant and the WFA. Included among industrial consumers who must obtain ration certificates from the Office of Distribution are textile, leather and paper processing agents; lubricants; protective coatings; coated fabrics; compounded rubber goods.

American Automobile Association, Washington, D. C., is operating a test fleet to cover about 30,000 miles at 35 miles an hour through all kinds of weather in 46 states during the first five months of 1944 in order to get data for automobile owners on the performance of several makes of synthetic rubber tires.

WPB Curtails Neoprene Uses; R-1 Again Revised

Increased demand for neoprene in many essential war products has compelled the Office of the Rubber Director to apply more stringent restrictions to its use, that agency declared February 2. This action has resulted in curtailed use in some war products and elimination of its use in other war products and in all but a few special and highly essential civilian items. Among the civilian rubber products affected are shoe cements and rubber yarn and thread. Based upon requests as estimated last year for use of neoprene, it was thought that there would be reasonable quantities of this synthetic rubber for elastic yarn and thread, as well as some other civilian items, by the Spring of 1944. But plans have had to be changed to meet the neoprene demands resulting from the production of invasion weapons. Many manufacturers will use Buna S for the production of rubber thread and comparable items. Effective last month, quota restrictions have been applied. Previously neoprene had been one of the types of synthetic rubber permitted for use as a general-purpose synthetic, within the limitations of the rubber regulations. For the next few months neoprene will be handled as a special-purpose synthetic. Allocations will be made by end-product use.

Rubber Order R-1, Appendix III as Amended February 1, 1944, gives shoe manufacturers a 60-day extension of the period within which they may make use of inventories of shoe cement containing crude rubber, from February 1 until April 1, 1944. The Rubber Director is permitting the liquidation of crude rubber shoe-cement stocks because the crude rubber contained in such cements cannot be salvaged for more essential uses under the rubber conservation program. The revision of Appendix III also contains a section relating to quota restrictions on neoprene.

Then ORD on February 4 reported Amendment 1 to R-1, effective February 4, with the object of further conserving the supply of various types of rubber cement, especially neoprene cement, for essential war purposes. In general the new regulations governing synthetic rubber cement can be summarized in this way: whereas synthetic types of cement could formerly be used for the manufacture of any product unless expressly prohibited, the situation is now reversed, particularly in the case of neoprene cement, so that hereafter use of such cements will be banned unless expressly permitted in the rubber regulations. Synthetic rubber cement, however, is still permitted for shoe manufacturing operations, except for neoprene cement, which may now be used for shoe manufacturing only in specified operations. Use of any kind of rubber cement is now prohibited in paper products. The only exception is in the case of paper products used in the manufacture of shoes. Previously rubber cement made from either synthetics or reclaimed rubber was permitted for a number of paper products. The new regulation has the effect of adding such products as greeting cards and graphic-art layouts to the prohibited list, which already includes upholstery, backings for rugs, and many other civilian items.

The new regulations also include a special provision permitting manufacturers to paint tires and tubes and to clip or shear curing-vent overflow. The latter material is produced in the course of manufacturing, when tires are formed in molds under great heat and pressure. Overflow appears on the finished product as rough irregular tatters of extruded rubber. The previous prohibitions against painting tires or removing vent overflow were applied to conserve manpower and speed up tire production. The prohibitions have been revoked to conform with current recommendations made by the rubber industry and by the Army and Navy procurement services.

Again, on February 15, the ORD further revised Appendix III in regard to milking machine inflations, hard rubber products, industrial protective clothing, non-leather shoes, and loans of synthetic rubber among manufacturers.

The conversion of milking machine inflations from crude to synthetic rubber has been postponed from February 1 to April 1, 1944 because manufacturers were unable to meet the original conversion date without loss of production. The manufacturers were advised of the postponement by individual directives. The effect of the postponement is to permit manufacturers of milking machine inflations to continue use of minimum quantities of crude rubber until April 1.

Effective February 15 no further natural rubber may be used in certain hard-rubber products for handling corrosive chemicals and explosives: as bottles, fittings, pistons. Previously the quantity of crude permitted varied from 60 to 30%. The new conversion puts these products on a completely synthetic basis.

Effective the same date a partial conversion was ordered for handmade component parts of machinery for the manufacture of rayon, corrosive chemicals, and explosives. Formerly up to 30% of natural rubber had been permitted in these items; now the crude rubber content is reduced to a maximum of 10%.

Manufacturers of compounds for proofing and seaming industrial protective clothing may now consume Buna S besides reclaimed rubber, without specific authorization. Such proofing compounds had been previously limited to reclaimed rubber, and it was necessary for a manufacturer to obtain special authorization before using general-purpose synthetics.

Rubber cements containing general-purpose synthetics are now permitted for non-leather shoes to the same extent that such cements have been allowed for leather shoes. Use of neoprene cements in non-leather shoes is confined to the same operations as have been previously provided in the case of leather shoes. This latest extension of the regulation governing cements has been made necessary by the fact that production of shoes from materials other than leather is substantial and requires the use of cements made from synthetic rubber.

Manufacturers of rubber products are now permitted to make temporary loans of general-purpose synthetics to other manufacturers without specific authorization. Full records of such loan transactions must be kept by both the persons lending and the persons borrowing. The transactions must be reported to the Office of the Rubber Director.

Tire Allotment Plan

Appendix IV to R-1, issued February 16 and operative for the second quarter of 1944, covers a comprehensive procedure for allocating and distributing tires on a quarterly basis. It governs the allocation of tires among official Claimant Agencies and provides for the control of tire production and tire shipment schedules to insure maximum planned output by the rubber industry. The allotment procedure has the effect of applying the principles of the WPB Controlled Materials Plan to the production and distribution of truck-bus tires, tractor-implement tires, and industrial tires, but not passenger-car tires. Also the new procedure in no way affects the method by which civilian consumers will procure replacement tires of the critical types involved. A civilian consumer who wishes to purchase replacement tires will continue to follow existing regulations of OPA and ORD.

In the past the Rubber Director has issued allotments of certain quantities of tires to such Claimant Agencies as the War Department, Navy Department, Office of Defense Transportation, and War Food Administration. However, the Rubber Director has not until now established procedures for controlling the actual procurement by each Claimant Agency of such allotted tires from the rubber industry. For example, equipment manufacturers producing rubber-tired vehicles for the Army have in the past been covered by a War Department tire allotment, but each manufacturer has proceeded independently to obtain necessary tires. Now under the new allotment plan the War Department, as a typical Claimant Agency, will have the direct responsibility of carrying out the administration of its allotment, under a standardized procedure, with the ORD serving as coordinator and clearing house. Confusion and competition among manufacturers of rubber-tired equipment will thus be minimized.

The new plan outlines in detail the steps which manufacturers of rubber-tired equipment must take to get tires. On or before the first day of the month preceding the quarter covered by a given allotment, each Claimant Agency must determine the number of tires which may be shipped to each of its vehicle manufacturers during the quarterly period and must authorize each manufacturer in writing to accept delivery of a specified number of tires. No vehicle manufacturer will be allowed to accept delivery of tires unless he has been specifically authorized to accept them by the Claimant Agency, and each manufacturer will be required to certify to his tire supplier that he has been authorized by the appropriate Claimant Agency to accept delivery. This must be done 15 days before the quarter begins. A standard form on which such certifications are to be submitted is included in the text of the plan.

The ORD explained that the new procedure in no way limits the functions now carried out by the various Claimant Agencies. To the contrary; the plan gives the Claimant Agencies an expanded authority and responsibility over the details of procurement and shipment of tires allotted to them by the ORD.

Material Shortages

Donald M. Nelson, WPB chairman, recently announced that military and essential civilian requirements for alcohol this year will require full usage of all alcohol facilities, including those formerly devoted to beverage alcohol. He further declared that industrial alcohol has become tighter because of the demand from the synthetic rubber plants. Government stocks of industrial alcohol have dropped from the high of 138 million gallons of last July to approximately 80 million gallons at the end of 1943, and will drop further to 41 million at the end of 1944. As about 30 million gallons are deemed the minimum necessary "working inventory" at synthetic rubber plants, arsenals, powder plants, and tankport terminals for Lend-Lease shipment, present reserves cannot safely be allowed to drop much more.

It is anticipated that the alcohol situation will remain tight as long as the rubber program needs all-out production from the plants making butadiene from alcohol. These plants are expected to operate at at least 150% of rated capacity during 1944. The

Rubber Director's most recent estimates call for 50% more alcohol in the first half of this year than had been envisaged in the original program. Requirements of industrial alcohol rose from 226 million gallons in 1942 to 433 million gallons in 1943 and are estimated at 632 million gallons for this year. Synthetic rubber needs for 1943 and 1944 are, respectively, 127 million and 328 million gallons of 190-proof alcohol.

The WPB Conservation Division on January 31 issued its eleventh "Material Substitutions and Supply List", covering some 450 materials needed in the war effort. As groups, chemicals and plastics are somewhat tighter than on the previous listings; while textiles and fibers remain about the same.

Rubber Director Bradley Dewey announced February 5 that the production of synthetic rubbers during January totaled almost 50,000 tons. He cautioned, however, that despite this large production all civilian drivers should take care of their passenger-car tires. He pointed out that even though this large amount of synthetics already had permitted the rubber manufacturing industry to step up to one-half again its 1943 rate, the military and essential civilian truck and bus requirements will, for many months, eat up the monthly increase that will gradually bring the production for the second half of the year to 75,000 tons a month.

Prospects for the full completion of the 1944 farm tractor production program brightened considerably February 4, according to the WPB, after the Tractor Industry Advisory Committee reported that despite slight delays in arrival of some component parts tractor manufacturing schedules are being met. Although the tractor manufacturing program is in a healthy condition, members of the committee, meeting in a two-day session in Washington, expressed concern over the rubber tire situation. War requirements have so depleted stocks of large-size tires that some members felt delay may be encountered in placing some of the completed tractors in use because of this shortage.

Rules governing the use of controlled materials after they are received by a manufacturer have been clarified in an amendment (February 2) to CMP Regulation No. 1, which deals with basic CMP allotment procedure, and now allows a manufacturer to use surplus material to fill another authorized production schedule than the one for which the material was originally acquired, if he changes the original allotment account. Rules governing returns of access or unused allotments of controlled materials have been modified (Direction 26, CMP Reg. 1, February 15) to bring them into conformity with WPB's decentralized operations.

Amendment 1, CMP Reg. 1, as Amended February 2, 1944, adds several items to Schedule III, including rubber insulated building wire and rubber insulated wire and cable (mold or lead cured).

The recently formed Synthetic Yarn and Tire Cord Industry Advisory Committee comprises: A. L. Freedlander, government presiding officer, and J. L. Bitter, North American Rayon Corp., Elizabethtown, Tenn.; Martin Castricum, United States Rubber Co., Detroit, Mich.; J. L. Moritz, American Enka Corp., Asheville, N. C.; Frank Griffen, American Viscose Corp., Wilmington, Del.; M. H. Richardson, Firestone Tire & Rubber Co., Akron, O.; Hayden B. Kline, Industrial Rayon Corp., Cleveland, O. H. J. White, E. I. du Pont de Nemours & Co., Inc., Wilmington; E. T. Lessig, B. F. Goodrich Co., Akron; J. E. McCarty, Goodyear Tire & Rubber Co., Akron.

Additional Restrictive Measures

Allocation Order M-363 places under full allocation control carbon tetrachloride, which formerly had been under limited control.

Allocation Order M-243, as Amended January 15, 1944, provides that no supplier shall deliver acetic anhydride, acetic acid or acetaldehyde without the specific authorization of the WPB unless the amount involved for resale, but not export, is under 5,000 pounds a month of each of the foregoing chemicals.

Limitation Order L-20, as Amended February 4, 1944, tightens some of the restrictions on the use of cellophane, but also offers relief in cases of extreme hardship where substitutes have proved unsatisfactory. Among the modifications in permitted uses is the one allowing the employment of cellophane in the manufacture of rubber products, as a substitute for Holland cloth in the backing of retreading stocks for tires, tire reliners, patches and sandblast stencils, and as a wrapping on friction and rubber tape; and in the packaging of paradichlorobenzene and naphthalene. Under the revised order, moreover, the definition of cellophane is changed to exclude sheeting, already under Allocation Order M-326-a.

General Preference Order M-65—Cadmium—underwent revisions on January 22 and 31.

Allocation Order M-30, as Amended February 3, 1944—Ethyl Alcohol—makes changes covering its definition, restrictions on deliveries and uses and exemption thereto.

General Preference Order M-254—Para-Phenyl Phenol Resins—was revoked February 15 and simultaneously these resins were made subject to General Preference Order M-246, as Amended February 15, 1944—Phenolic Resins and Phenolic Resin Molding Compounds.

An amendment (February 18) to Direction No. 5 of Priorities Regulation No. 3 makes changes in phraseology for the purpose of clarification and prohibits the extension of AA-1 and AA-2 blanket maintenance, repair, and operating ratings to secure production materials on the list attached to the direction. Direction No. 5 is broadened by the amendment. Under the earlier direction a person having a production materials rating could employ it to get materials on the list as maintenance, repair, and operating supplies for use only in the production for which the rating was assigned. The amendment omits the former qualification "for use in the production of that product." Acetylene, carbon dioxide, glue, carbon tetrachloride, hydrogen gas, nitrous oxide, oxygen, and trichlorethylene have been removed from the list. New items are muriatic acid, sulphamic acid, Courmarin, magnesium hydroxide, magnesium oxide, pine oil, pine tar oil, gum resin, wood resin, gum turpentine, wood turpentine, and vanillan.

Among the revisions of General Limitation Order L-43, as Amended February 16, 1944—Motorized Fire Apparatus—is one ruling that no manufacturer or distributor install any new or used rubber tires on any auxiliary pumping equipment and no person sell or deliver such tires for an auxiliary pumping unit, except to fill "government orders" as defined in R-1.

On February 11 the WPB issued a clarification on the effects of amendments to Conservation Order M-356, issued February 8 and erroneously stated in a press release of that date. This release stated that under the terms of the amended order producers of high-tenacity tire-type yarns had been relieved of the obligation of meeting export quotas for fine rayon yarns (viscose cupra). Such is not the case. The purpose of the amendment is to distribute equitably among producers of fine rayon yarns the burden of filling export orders for this item by excluding from the total spindles on which the export percentage is based those spindles used in the production of high-tenacity yarns. Prior to the amendments of February 8 the percentage of fine rayon yarns to be set aside for meeting export quotas was based on production of all rayon yarns, including the high-tenacity yarns for tires.

EASTERN AND SOUTHERN

Adopts New Name

Wishnick-Tumpeer, Inc., 295 Madison Ave., New York 17, N. Y., manufacturer and distributer of chemicals, pigments, and asphalt products, has changed its name to Witco Chemical Co., but will make no changes in corporate structure, management, or personnel. The decision to adopt the new name, based on the company's long-established trade mark Witco, was prompted by the feeling that the firm name should be more descriptive of the business and consistent with the company's activities in the fields of chemical research and manufacture.

Since its founding in 1920, Wishnick-Tumpeer's development in the chemical industry has been characterized by a continual expansion of its manufacturing facilities as well as the broadening scope of its line of chemical products. In 1926, Witco acquired the Pioneer Asphalt Co. plant in Lawrenceville, Ill., followed in 1933 by the purchase of the Panhandle Carbon Co., Borger, Tex., where Witco carbon blacks have been manufactured ever since. Four years ago a new research laboratory was added in Chicago along with the erection of a plant for the manufacture of chemical specialties.

Like all others in the chemical industry, the company is actively engaged in war work, with its laboratory concentrating particularly on the study and solution of synthetic rubber compounding problems.

Witco Chemical has been appointed sole distributer of the complete line of blacks manufactured by Continental Carbon Co. at Sunray, Tex.

In making this announcement, Robert I. Wishnick, president of both Witco Chemical and Continental Carbon, stated, "The combined research and rubber testing facilities of both companies are now made available to consumers of Witco and Continental blacks, which will enable us to offer a broader service and added technical assistance in the compounding problems imposed by the synthetic rubber program."

The Thermoid Co., Trenton, N. J., and domestic subsidiaries reported January sales at $1,168,219, up 8.6% over the sales of $1,075,622 recorded for January, 1943.

© Bachrach

Emil H. Krismann

George W. Smith

Krismann and Smith Advanced

E. I. du Pont de Nemours & Co., Inc., Rubber Chemicals Division, Wilmington, Del., has made Emil H. Krismann assistant sales manager of the division. He will devote part of his time to sales executive matters in the Wilmington office and part to technical service to the rubber industry in all parts of the country. For the past eight years Mr. Krismann was in charge of technical service on rubber, neoprene, and other synthetic rubbers to the New England rubber industry and was located in Boston, Mass. Prior to going there he had been on the staff of the du Pont rubber laboratory at Carney's Point, N. J., several years.

George W. Smith, recently with the WPB in Washington, D. C., as assistant chief, Intermediates Unit, Chemical Division, succeeds Mr. Krismann as technical service representative in New England, working from du Pont's Boston office at 140 Federal St. Mr. Smith formerly was with the Barrett Co. and Hood Rubber Co. He is a graduate of the Massachusetts Institute of Technology and resides at 4 Inverness Rd., Winchester, Mass. He is currently doing some special work at the du Pont rubber laboratory and will take over his assignment in New England in April when Mr. Krismann reports to Wilmington.

Both Mr. Krismann and Mr. Smith are also past chairmen of the Boston Group.

Rubber Reclaimers Elect

At the recent annual meeting of The Rubber Reclaimers Association, Inc., 533 E. 82nd St., New York 28, N. Y., the following directors were elected for 1944: Allyn I. Brandt, vice president, The Philadelphia Rubber Works Co., Akron, O.; Robert E. Casey, general sales manager, Naugatuck Chemical Division, United States Rubber Co., 1230 Sixth Ave., New York 20; R. L. Lasser, manager, rubber division, Endicott Johnson Corp., Johnson City, N. Y.; F. E. Traflet, vice president, Pequanoc Rubber Co., Butler, N. J.; and Wm. Welch, president, Midwest Rubber Reclaiming Co., East St. Louis, Ill. Then the board elected the following officers for the year: president, Jean H. Nesbit, president, U. S. Rubber Reclaiming Co., 500 Fifth Ave., New York 18; vice president, U. H. Dingmon, president, Xylos Rubber Co., Akron; secretary-treasurer, Marion B. Miller, 833 E. 2nd St., New York.

Also at the meeting the following committees were appointed:

Executive: chairman, Gilbert K. Trimble, vice president, Midwest Rubber Reclaiming; and Messrs. Brandt and Casey.

Capacity: chairman, Mr. Dingmon, Mr. Casey, and David W. Bernstein, manager, Panther-Panco Rubber Co., Stoughton, Mass.

Scrap: chairman, E. H. Brooks, director of purchases, Goodyear Tire & Rubber Co., Akron; and Messrs. Dingmon, Traflet, and Welch.

Membership: chairman, H. S. Royce, general purchasing agent, Boston Woven Hose & Rubber Co., Cambridge, Mass.; D. S. Morse, vice president, Bloomingdale Rubber Co., Chester, Pa.; and Mr. Trimble.

Advertising: chairman, John P. Coe, general manager, Naugatuck Chemical; Irving Laurie, president, Laurie Rubber Reclaiming Co., New Brunswick, N. J.; and R. H. McLeod, superintendent, reclaiming department, Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J.

Technical: chairman, Fred Conover, in charge of research and development of latex and dispersions, Naugatuck Chemical; Robert L. Randall, chief chemist, Midwest Rubber Reclaiming; Earl B. Busenburg, chief chemist, Philadelphia Rubber; W. G. Kirby, research chemist, reclaimed rubber, Naugatuck Chemical; Douglas Chalmers, chief chemist, Gates Rubber Co., Denver, Colo.; F. L. Kilbourne, chief chemist, Xylos Rubber; S. C. Nicol, Goodyear; John S. Plumb, vice president, U. S. Rubber Reclaiming; John C. Walton, superintendent, Boston Woven Hose; and Messrs. Morse, Laurie, and Traflet. Chemists of the other member companies may be called for collaboration, when necessary, at the request of the chairman.

U. S. Rubber News

United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., through an investment in capital stock has become associated with Compania Croydon del Pacifico, S. A., Cali, leading rubber manufacturer of Colombia, according to L. C. Boos, vice president of United States Rubber Export Co., Ltd. The Colombian company will continue to manufacture its own products under its own name, but also will eventually produce and distribute in Colombia certain U. S. Rubber lines and will draw on the technical knowledge and skill of the American company for development and improvement of rubber products for the markets of Colombia. Present products of the Croydon company include canvas rubber-soled shoes, molded rubber products, industrial rubber goods, and camelback. Ernest A. Leupin will continue as general manager of the Croydon company. Alexander Watt, formerly branch manager for U. S. Rubber export in Bogota, has been appointed sales manager. The U. S. Rubber sales office in Bogota will be merged with the sales organization of Croydon.

This investment marks the second such association made recently in Latin American manufacturing plants. In March, 1943, U. S. Rubber purchased capital stock of Compania Hulera Mexicana, S. A., manufacturer of "Tornel" tires and tubes.

"The American Scriptures", intermission feature of the New York Philharmonic-Symphony Sunday afternoon broadcasts on CBS, was presented with an Award for Distinguished Merit by the National Conference of Christians and Jews at a luncheon at the Yale Club, New York, February 21, as a feature of Brotherhood Week. The award was accepted by Thomas E. Young, advertising director of U. S. Rubber, sponsor of the broadcasts.

With the establishment of a Gillette tire division by U. S. Rubber on January 1, a field sales organization responsible only for Gillette sales and distribution was organized, according to Walter D. Baldwin, sales manager of the division. A series of meetings is now being held throughout the nation with Gillette jobbers and sales organization by Mr. Baldwin, during which Gillette's 1944 sales and merchandising plans are being outlined.

Building permit has been issued for construction of a new warehouse, 30 by 95 feet, at the U. S. Rubber plant at 5675 Anaheim-Telegraph Rd., Los Angeles, Calif., at a cost of $8,000.

Effective February 1, W. S. Long, formerly operations manager of U. S. Rubber's Los Angeles plant, was appointed Pacific Coast sales manager, mechanical goods, according to W. H. Cobb, general manager of the mechanical goods division. Mr. Long also remains in charge of war products activities on the Pacific Coast.

J. M. Miller will continue as factory manager of the Los Angeles plant, it was announced by J. W. McGovern, general manager of the company's tire division.

The Rubber Club of the company's Providence, R. I., plant was formally organized February 17 at a sports night gathering in the Palestine Shrine Club, at which more than 125 persons attended. Among the officers elected were: president, Joseph Kenney; secretary, Harry Schoening; and treasurer, Robert Heusel. Irving S. Black, Sr., was master of ceremonies, and musical selections were given between addresses. Ed Ruelbach, former major league pitching star, was the principal speaker. Others included Coach Rip Engle, of Brown University basketball team, and Frank Matzek.

L. Goodrich, of the U. S. Rubber Indianapolis, Ind., plant, has been elected secretary of the Cycle Parts & Accessories Manufacturers Association.

New Developments

Multipore rubber filter screens, either of hard or soft rubber and compounded to re-

sist abrasion, high temperature, alkaline and acid solutions, and certain oils and greases, have found many uses during the war period, according to Herbert E. Smith, president of U. S. Rubber. Multipore rubber is an outgrowth of development work on the use of natural rubber latex for waterproofing raincoat fabric carried out some 18 years ago. Pinholes almost microscopic in size appeared in the rubber coating after fabric treated with rubber latex had been heated in a drier. After considerable research and development work it was found that sheets of rubber up to 42 inches wide and 20 yards long, containing 6400 holes per square inches could be prepared. Multipore filters are now used in filtering blood plasma, purifying insulin, filtering fruit juices for shipment abroad, aiding the production of magnesium metal, increasing the output of coal and steel, and speeding up the production of four-engine bombers.

The use of conductive rubber installed as a heating pad on the gun breeches of machine guns and aerial cannon has given gun crews of United Nations aircraft another margin of safety to add to their air supremacy and plane performance. A heater consisting of cotton fabric impregnated with a special conductive synthetic rubber compound and containing high resistance wires for heat generation and then the whole assembly covered with another synthetic rubber compound for insulation against outside short circuit has been developed by the rubber company. The heating pad makes possible the preheating of gun breeches while the plane is grounded, or maintains the required temperatures for instantaneous use at high altitudes. This heating eliminates jamming caused by the high viscosity of oils and greases and the contracting of steel under certain atmospheric conditions.

Warnings issued last fall asking that all old golf balls be turned in for reprocessing have in the main gone unheeded, and unless players sufficiently interested in the game will collect every available ball everywhere and send it in to be reprocessed, the game faces practical extinction until after the war, reports John Sproul, manager of the U. S. Rubber golf ball department. During 1941, 2,000,000 dozen new golf balls were sold through all outlets. In 1943 no new golf balls were manufactured, and the quantity of reprocessed golf balls available from all sources amounted to only 25% of the new ones sold in 1941.

Inflatable invasion boats of synthetic rubber, designed to glide noiselessly in shallow water, are being produced in quantity at the Woonsocket, R. I., plant of U. S. Rubber. The boats have quick-release towing bridles; so they can be towed behind fast boats and released to beach themselves by their own momentum. Equipment includes twelve paddles, outboard motors, repair kits, a signal flag, bullet hole plugs, an extra inflatable floor for added buoyancy, and a life line all around the boat. An inflatable gunwhale will keep out spray and act as a bumper when the boats are being loaded for action. These boats, designed to hold ten men, will be easy to carry to invasion points because they are collapsible, pack in compact carrying cases, and are quickly inflated. Special mildew-proofing of the fabric will protect the boats from mold in damp, humid climates.

General Magnesite Expanding

With a background of 30 years' experience of specialization in the manufacture and distribution of magnesia products exclusively, General Magnesite & Magnesia Co., Philadelphia, Pa., recently announced a change in management and a program of plant expansion. Ralph E. De Turk, general manager, was formerly connected with the engineering department of a large Midwest manufacturer, while Robert F. Turner, sales manager, was associated with the Philip Carey Mfg. Co. as sales supervisor for the past 22 years in Memphis, Chicago, Cleveland, and Philadelphia.

New production equipment is now being installed to meet the strong and increasing demand for extra-light calcined magnesia which goes to the rubber trade, especially for neoprene compounding. General Magnesite was the pioneer producer of neoprene-type extra-light magnesia.

For many years General Magnesite has also been a leading producer, importer and processor of caustic calcined magnesite—heavy magnesia. The firm also announced a complete line of both mineral and seawater types of heavy magnesia, available in four screen test specifications, to meet the exacting code pigment specifications of the rubber trade.

Sales and distribution will be handled, as in the past, through agents located in the principal rubber manufacturing centers.

The National Victory Garden Institute, 598 Madison Ave., New York 22, N. Y., on February 10 reported that William M. Jeffers, head of the Union Pacific Railroad and former Rubber Director, had accepted the chairmanship of the Institute's industrial advisory garden committee, the chief purpose of which is to encourage industrial concerns to cooperate in promoting the Victory Garden Movement the coming spring and summer. Among the 31 leaders of diversified industries serving with Mr. Jeffers are: W. S. Carpenter, Jr., president, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; John L. Collyer, president, B. F. Goodrich Co., Akron, O.; Henry Ford, president, Ford Motor Co., Detroit, Mich.; Ralph Kelly, president, Baldwin Locomotive Works, Eddystone, Pa.; Paul W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co., Akron; Frank Phillips, chairman, Phillips Petroleum Co., Bartlesville, Okla.; and Edgar M. Queeny, chairman, Monsanto Chemical Co., St. Louis, Mo. Russell A. Firestone, assistant treasurer of the Firestone Tire & Rubber Co., Akron, is a vice president of the National Victory Garden Institute.

Baldwin Locomotive Works, Eddystone, Pa., on February 15 announced the appointment of C. E. Kraehn as assistant to V. H. Peterson, who is in charge of all sales activities of the company.

C. F. Hoover, connected with the sole and heel, flooring, hard rubber, and battery separator activities of the United States Rubber Co.'s Providence, R. I., and Passaic, N. J., plants as a control and development chemist, has taken a position as director of development for the Essex Rubber Co., Trenton, N. J. He replaces Jack Miscall, who recently resigned from that position. Mr. Hoover has served as a member of the R. M. A. Industry Technical Committee and the Consulting Technical Committee, Office of the Rubber Director, on soles and heels.

Huntington Rubber Co., manufacturer of camelback, 4010 Whiteside Ave., Los Angeles 33, Calif., plans an addition to its plant to cover 44 by 79 feet and to cost $1,500.

OHIO

Firestone Tire & Rubber Co., Akron, on January 30 announced that it would redeem all its 6% cumulative preferred stock, series "A", outstanding on March 1 at $105 a share plus $1.50 a share in lieu of the current quarterly dividend which would be payable on the redemption date.

At the annual stockholders' meeting on January 22 the following directors were reelected: John W. Thomas, Harvey S. Firestone, Jr., Lee R. Jackson, John J. Shea, James E. Trainer, Harvey H. Hollinger, Stacy G. Carkhuff, Russell A., Leonard K., and Raymond C. Firestone. At the board meeting all company officers were reelected: Mr. Thomas, chairman; Harvey S. Firestone, Jr., president; Mr. Jackson, executive vice president; Mr. Shea, vice president and treasurer; Mr. Trainer, vice president in charge of production; Harold D. Tompkins, vice president in charge of sales; Mr. Hollinger, secretary; Claude A. Pauley, comptroller; Russell A. Firestone, Ralph S. Leonard, and William D. Zahrt, assistant treasurers; Joseph Thomas, counsel and assistant secretary; Henry S. Brainard, assistant secretary; Timothy F. Doyle and Laurence A. Frese, assistant comptrollers.

The harnessing of air to absorb the shocks of airplane landings, take-offs, and taxiing runs was announced last month by the Firestone company, originator of a new-type landing mechanism called an air-spring strut. Tests are said to show that this device adds to the comfort and safety of flying, increases the life of airplanes, and reduces maintenance costs through elimination of landing shocks and taxiing vibrations. The air in the new landing mechanism is confined in a flexible rubberized container which operates much like an accordion bellows. With the air-spring, all the shock-absorbing properties of a pneumatic tire are repeated in the landing strut. To absorb the tremendous energy of an airplane's first impact in landing, oil heretofore was generally used, confined and forced through a small hole at high pressure. The Firestone air-spring uses an identical principle except that a large volume of air at low pressure is used instead of oil. The simple design of the air-spring eliminates pressure-tight sliding joints and their leakage and friction troubles and reduces weight and cost. The landing mechanism can be engineered to fit any plane.

The Timken Roller Bearing Co., Canton 6, has promoted H. B. Lilley, formerly assistant chief inspection engineer in the steel and tube division, to the position of sales development engineer, specializing in the application of mechanical tubing to machine tool products and other engineering applications. Mr. Lilley graduated from Carnegie Institute of Technology as a mechanical engineer in 1924 and has been employed by the Timken steel and tube division in various capacities connected with the inspection of tubular products.

Seiberling Personnel Changes

Directors of Seiberling Rubber Co., Akron, have named new officers to fill the vacancy caused by the death of W. E. Palmer, secretary and assistant treasurer, President J. P. Seiberling reported February 1. Under a new program dividing duties of the office, W. P. Seiberling, accessories and repair materials sales man-

ager, becomes secretary; while H. E. Thomas, since 1927 assistant secretary under Mr. Palmer, now is also assistant treasurer. W. A. M. Vaughan continues as vice president and treasurer, and other offices remain unchanged.

W. P. Seiberling, a son of F. A. Seiberling, company chairman, has been with the company since its inception in 1921. He has been active in the development and promotion of the company's puncture-sealing inner tube and has been in charge of camelback and repair materials sales since 1921. He also is a trustee of Akron Peoples Hospital and active in the Akron Skating Club.

Mr. Thomas joined the Seiberling organization in 1926 after previous bookkeeping experience at the Babcock & Wilcox Co. and the Pittsburgh Valve & Fittings Co. When his brother, R. J. Thomas, went to Canada in 1927 to head Seiberling Rubber Co. of Canada, Ltd., he was named assistant secretary. He is president of Fairlawn Country Club of Akron and a 32nd degree Mason.

Appointment of Paul B. Means as manager of the diversified products department of Seiberling Rubber was announced last month by Col. J. L. Cochrun, vice president in charge of sales. Mr. Means returns to the department he started in 1937 as part of a program to expand its facilities. For the past four years he was manager of Seiberling's branch in Atlanta, where he is succeeded by W. T. Johnson, manager of the company's Boston branch. L. E. Kersey, New York branch service engineer, succeeds Mr. Johnson in Boston.

J. P. Seiberling told the Canadian Section, Society of Automotive Engineers, in Toronto, Ont., Canada, February 16, that the battle of rubber had been won, but that if it had been lost, it might well have meant the loss of the war itself. In the 22 months since Pearl Harbor the rubber and affiliated industries have given the military of the United Nations all the rubber, synthetic and natural, which will be needed for victory.

Mr. Seiberling further said that synthetic rubber tires for the ordinary user might be available for passenger cars late in 1944, but at present such tires may be obtained only by the essential car users. He said that passenger tires are being held back now by the enormous demand for GR-S. Progress in the production of GR-S is behind schedule, since plant construction has been delayed by the demand for such equipment as valves, etc., by the aviation gasoline program, with the resultant delay in obtaining these items for the synthetic plants. Education of the public to the precautions necessary with synthetic rubber tires in summer in order to prevent premature failure due to overloading and underinflation was emphasized. Problems confronting the industry in the manufacture of synthetic truck tires are being eliminated, Mr. Seiberling said. It has been found that rayon cord is better than cotton, and since the supply of rayon cord has improved recently, he expressed the opinion that the needs of truck tires will come close to being met by fall. He warned, however, that truckers in the meantime will have to be more careful in order to help the industry through a critical period without a serious transportation shortage.

Dayton Rubber Mfg. Co., Dayton, has made T. C. Davis, formerly manager of industrial sales, vice president in charge of mechanical sales planning and experimental sales, and T. D. Slingman, formerly New York district manager, vice president in charge of mechanical sales.

C. P. Hall

Hall's Silver Jubilee

The C. P. Hall Co., Akron, prominent manufacturer and distributer of rubber compounding ingredients and chemicals, is currently celebrating the twenty-fifth anniversary of the business. C. P. Hall, employed in a large rubber factory, realized that a number of chemical houses needed representation in Akron to serve, properly, the many rubber factories in Akron and vicinity. At the time most suppliers were oversold, and the sledding was hard—in fact Mr. Hall distributed more than 1,000 cars of fuel in the interim, but thereby made contacts that later proved very profitable.

As the company grew, it began to job and then manufacture special items such as "Para Flux", "Stabilite", "Stabilite Alba", "SPDX", and "Phenex", the latter four made under the Morton patents.

The business grew steadily through the years until at the present time there is a staff of twenty at the headquarters offices in Akron, and for a number of years a branch has been operated in Los Angeles, Calif., to take care of the requirements of trade on the Pacific Coast.

Goodrich Appointments

Appointments in the recently created chemical division of The B. F. Goodrich Co., Akron, O., were announced by W. S. Richardson, division head, as follows: William I. Burt, general manager of plants; Frank K. Schoenfeld, director, technical and development; Victor E. Wellman, director of purchases; and Harry E. Foster, general auditor. Mr. Burt will be responsible for operation of all plants in the chemical division; Dr. Schoenfeld of technical matters, sales service, and process development; Dr. Wellman of all purchasing and raw material inventory control; and Mr. Foster for all plant and sales accounting. Mr. Burt, with the company since 1927, received his B.S. degree in chemical engineering from Ohio State University. Dr. Schoenfeld joined Goodrich the same year, after receiving his B.S. degree in chemical engineering from the University of Michigan; he later received his master's and doctor's degrees from Western Reserve University. Dr. Wellman, who came to the company in 1929, is a graduate of Phillips University where he obtained a degree in chemistry, later receiving his master's and doctor's degrees from the University of Washington. Mr. Foster, with Goodrich since 1917, has been engaged in cost accounting during all his career with the company.

The division operates the government-owned synthetic rubber plants at Louisville, Ky., Borger and Port Neches, Tex., as well as raw materials plants at Louisville, Niagara Falls, N. Y., and Akron. Among the most important products of the latter are polyvinyl resins. The company recently announced that it has developed and is offering a unique group of these to industrial users under the name Geon, which will expand the field served by this class of plastic materials.

H. W. Catt has been made manager of the chemicals and pigments department of the Goodrich purchasing division, succeeding Dr. Wellman, according to A. D. Moss, director of purchases. Mr. Catt, a graduate of the University of Illinois with a degree in chemical engineering, found employment with Goodrich in 1929, was engaged for 10 years in chemical research and rubber compounding, and entered the purchasing division as a buyer of raw materials and pigments in 1939.

LeRoy Wagner, Pacific Coast representative of the Miller rubber sundries division of the Goodrich company, celebrated his fortieth anniversary with the company in January. Mr. Wagner, who has held his present post for more than 25 years, was presented his 40-year service pin at a recent conference of sundries sales representatives and executives by C. O. DeLong, manager of Goodrich sundries sales.

Other Announcements

Goodrich on February 10 notified holders of its first-mortgage 4¼% bonds due 1956, that $810,000 of the issue had been drawn for redemption of 102 and accrued interest on March 15.

The first modernization of design in tires to offset the higher heat-generation of synthetic rubber was announced February 8 by Goodrich in introducing a new "speedliner" truck tire featuring new ventilating grooves on the side of the tread and reduced thickness of tread at the shoulder.

"Heat has always been the Number One enemy of tires, especially in the heavier truck sizes," explained Harold Gray, technical superintendent of the company's tire division, "and the greater tendency of synthetic rubber to generate heat under flexing naturally has added to this problem. In a controlled test on two 9.00 by 20 ten-ply tires, the new-design tire ran 22 degrees cooler at the shoulder, and five degrees cooler even at the tread center, where no design changes have been made."

Speaking before the Technology Club of Syracuse, N. Y., in January, on the "Power of American Research", Howard E. Fritz, director of research for the Goodrich company, reviewed the growth of industrial research activity in the United States, particularly from 1920 to date, and paid tribute to the chemists, physicists, engineers, and all other groups that make up the power of this American research. Listing the developments which became accomplished facts between World War I and World War II and which were either unheard of or considered impossible at the beginning of the first World War, Dr. Fritz then indicated some of the things that should become possible after the present war is over, and we can fully utilize the force of this great power, American research. Light metals in abundance, new petroleum chemicals, new plastics, and hundreds of rubbers and materials with rubber-like properties, performing unique and unexpected jobs and made from wheat, corn, garbage, soybeans, coal,

petroleum, limestone, milk, sweet potatoes, and salt were in this postwar list.

Reviewing the synthetic rubber program, he concluded that this war-born miracle industry has created a ceiling over the price that rubber-consuming America will have to pay in the future for this indispensable material. The days of rubber industry planning in which the price of the basic raw material was always of the first and greatest consideration are over, probably forever —another forceful example of "the power of American Research", he said. In commenting further on the outlook for the postwar period, it was stated that although the war had brought profound changes in the way of pooling of technical "know how", when peace returns, all industry from a technological viewpoint will start from scratch; and if one was going to place a bet on this race, he should keep an eye on the fellow with the aggressive, outstanding research and development facilities.

James Newman, Goodrich vice president, on a recent business trip to California reported that company facilities in Los Angeles are being expanded at a cost of nearly $2,000,000 to meet the expected large demand for tires when this nation returns to its normal pursuits. He also urged that synthetic rubber be not put out of business after the war principally because it could be expected to provide a stabilizing effect on the price of crude rubber from Far Eastern plantations. Mr. Newman feels that at least 150,000 to 200,000 tons of synthetic rubber production should be maintained in the United States after the war, pointing out the innumerable uses in industry where the artificial product has been found superior to the natural.

Mr. Richardson last month predicted that a market for synthetic rubber production will exist, after peace comes, in the manufacture of combination synthetic-natural rubber tires with twice the life of prewar ones. "The tire of the future", according to Mr. Richardson, may be natural rubber tires recapped with synthetic rubber camelback. The advantage of the synthetic compared with the natural product is the former's high abrasion resistance, but ply separation forms the outstanding disadvantage with synthetics. He too mentioned the stabilizing effect synthetic rubber output could have upon the price of plantation rubber.

Goodyear Activities

The Goodyear Tire & Rubber Co. factory at Jackson, Mich., is now completely devoted to the manufacture of tires and tubes, for all war production schedules have been completed or moved to other Goodyear plants. This is the second company plant to reconvert to tire manufacture and is part of Goodyear's thirty-million dollar expansion campaign in the tire building field. The Jackson plant was exclusively a tire factory before its conversion to building cannon and other war materials. Output prior to Pearl Harbor ran about 9,000 tires daily. Present schedules call for the plant to reach capacity figures about December 1. Present production is about one-third of capacity. Tires now being made at Jackson are mainly for military vehicles.

Frank T. Magennis has been named a vice president of The Goodyear Tire & Rubber Export Co. He formerly was an assistant manager of that company. Joining Goodyear in August, 1917, he was employed in the service department of the parent company until he entered the Naval Flying Corps in the first World War. Mr. Magennis rejoined Goodyear in August, 1919, going to the export company. His first overseas assignment was as general line salesman in Central America, Colombia, Ecuador, Peru, and Bolivia. For the next several years, up to 1926, he covered Central America, the West Indies and South America with varying assignments. Then in 1926 he was made manager of Goodyear Cuba, with headquarters at Havana. After four years he became manager of Goodyear interests in Brazil, where he was located at Sao Paulo until 1936. Next, on January 1, 1937, Mr. Magennis was appointed vice president of Goodyear's operations at Buenos Aires, Argentina, where the company had a factory. In 1941 he was recalled to this country as assistant manager of the Goodyear export company.

Everett D. Beadle, veteran Goodyear sales representative, will be the company's Pliofilm representative throughout the West Coast and in Hawaii, according to A. F. Landefeld, manager of Pliofilm sales. Mr. Beadle's headquarters will be in Los Angeles, Calif., for service to packagers, fabricators, and food processors west of the Rocky Mountains. After starting with Goodyear on the production squadron at the plant in California in 1925, Mr. Beadle was in the technical service department for three years before transferring to the service department, sales division, in Fresno, Calif. He subsequently was a general-line salesman and Life Guard-Double Eagle representative in Denver before moving to Goodyear Aircraft in Akron two years ago as department and division foreman in the construction of wings for B-26 bombers.

As a result of worldwide interest in Pliofilm's postwar packaging possibilities, Goodyear last month recalled L. K. Hanson from Mexico City, Mexico, to manage Pliofilm foreign representation for the firm's export company. Mr. Hanson, sales manager in Mexico City for Goodyear-Oxo for the past two years, will be assisted by L. H. Brandl, who represented Goodyear's Pliofilm division in India, Australia, and South Africa before the war. Headquarters of both will be in Akron. A veteran of 17 years with Goodyear, Mr. Hanson has represented Goodyear abroad for most of that time, including service in South America, continental Europe, and the Near East. He was in charge of Pliofilm foreign sales before the war.

Paul J. Flory, formerly with the Esso Laboratories of the Standard Oil Development Co., has joined the Goodyear research laboratories.

Recent Developments

Five new developments resulting from the program of research being carried on in the Goodyear research laboratory were announced by its director, L. B. Sebrell, late in February. A new synthetic rubber made from butadiene, but in which the styrene of GR-S is replaced by a different monomer was reported as the first accomplishment. The new synthetic rubber promises to be a superior type for the manufacture of tires since it has the energy resilience and the crack growth resistance of natural rubber. It has not yet been developed to the point where it will show high tensile strength at high temperatures, and its cost is quite high, but it was said that test tires are now in the process of manufacture and they will be given road tests to measure actual performance in comparison with tires of natural rubber and GR-S.

The next development was reported as a second new synthetic rubber designed to duplicate the chemical activity of natural rubber for use wherever synthetic rubber is needed that will react chemically, for example, in the manufacture of chlorinated rubber for paints, lacquers, bonding compounds, etc. The third development was the announcement that special milling and processing techniques devised in the Goodyear laboratory had succeeded in producing samples of GR-S that also could be more readily chlorinated. The fourth and fifth accomplishments were the development of two new accelerators to speed up the rate of vulcanization of GR-S rubber.

It was also announced separately by Dr. Sebrell that a new anti-ice "boot" for airplane propeller blades, which employs synthetic rubber compounded especially to conduct electricity, has been developed and has undergone exhaustive tests. It was stated that the new "boots" provide complete elimination of past hazards due to ice propellers and have a potentially wider range of applications for the leading edges of airplane empennages. The "boot" for each blade of an airplane propeller weighs about a pound, and in addition to the core of a thin sheet of conductive rubber, on the inside of each "boot"—the portion cemented to a propeller's leading edge—is a reenforcing layer of fabric and another layer of synthetic rubber. The exterior has a heavier layer of synthetic rubber to provide the necessary resistance to abrasion. Wires connected to the core of conductive rubber are also connected with a generator in the propeller hub by means of which warming electricity for each "boot" is provided for melting and removing the ice formed on the propeller blade.

MIDWEST

Reichhold Research Reorganized

Henry H. Reichhold, chairman of the board, Reichhold Chemicals, Inc., Detroit, Mich., last month revealed that the personnel of RCI research laboratories has been enlarged about 25% during the past few months and, further, that all work of these laboratories is being centralized at the main plant in Detroit, where a rather complete program of reorganization has taken place. Heading up the reorganized research department is John J. Bradley, Jr., director in charge of research. Mr. Bradley, besides supervising the direction of all activities concerned with research policies, programs, and personnel, also acts as liaison officer between the research department and the company's executive research advisory board, composed of the following: chairman, C. J. O'Connor, president; co-chairman, Mr. Bradley; advisory members: Mr. Reichhold; Albert G. Goetz, secretary and vice president in charge of legal affairs; Paul L. Swisher, vice president in charge of sales and advertising; S. H. Baum, vice president in charge of eastern resin plant; T. P. Brown, general manager of chemical color division; P. J. Ryan, vice president in charge of production at Detroit plant; H. L. Wampner, director of technical sales service at Pacific Coast plant; and Carl H. B. Jarl, chief engineer at phenol plant in Tuscaloosa, Ala.

RCI's research laboratory is now divided into seven separate divisions, each in charge of and directed by the men named: division of coating resins, A. G. Hovey; phenol plastics, Harry Kline; chemicals, Arthur C. Lansing; chemical pigments, Harold E. Weisberg; patents, Mr. Hovey; market research, J. Frank Maguire; and special compounds, E. F. Siegel.

Monsanto Personnel Promotions

Monsanto Chemical Co., St. Louis, Mo., on February 1 through D. S. Dinsmoor, vice president and general manager of the company's Merrimac Division, Everett, Mass., announced the appointment of William J. Colvin as plant manager of the Camden, N. J., operations of the Monsanto company, to succeed John J. Heck, who has retired after more than 50 years in the lampblack business. Mr. Colvin began working as a member of the mechanic crew in 1923 for Merrimac Chemical Co., which was taken over by Monsanto in 1929 and liquidated as a separate corporation in 1937. Later he was transferred to the laboratory and in 1933 was made foreman of the alcohol and carbon dioxide department of the Monsanto operated New England Alcohol Co. at Everett. In May, 1942 he was transferred to the Camden plant as assistant superintendent under Mr. Heck.

Wilfred M. Adey, in charge of the synthetic nitric acid department of the Everett plant, becomes technical assistant to Mr. Colvin at Camden. Mr. Adey joined Monsanto in January, 1942, after graduation from Massachusetts Institute of Technology.

The promotion of J. H. Clark, general manager of sales for Monsanto's plastic division, to the post of sales director was announced February 7 in Springfield, Mass., by J. C. Brooks, vice president and general manager. Mr. Clark became general manager of sales in 1938 when Monsanto acquired the Fibreloid Corp., which he had served in a similar capacity from 1935.

F. A. Abbiati, assistant general manager of sales since 1939, succeeds Mr. Clark as general manager.

J. R. Turnbull, manager of the development and sales promotion departments, has been named assistant general manager of sales in charge of sheet materials, which in the future will include nitrocellulose, cellulose nitrate and cellulose acetate sheets, rods, and tubes, Vuepak and other packaging materials, and those articles made in the fabricating and Opalon departments, Saflex safety glass sheeting, Saflex coatings and compositions, and vinyl resins. He will continue to be in charge of the development and sales promotion departments.

S. L. King has been made sales manager of the vinyl resins department and will now be responsible for sales of safety glass materials, vinyl compositions and coatings, and nitrocellulose flake sales.

All melamine resins and molding compounds produced by Monsanto Chemical are now being sold under the trade name "Resimene", according to F. A. Abbiati, general manager of sales of the plastics division.

Montague A. Clark, formerly Michigan director of the War Manpower Commission and for 12 years prior to that with the United States Rubber Co. in Detroit, Mich., has become manager of the public relations department of the Motor Products Corp., Detroit.

Sider Now Loewenthal Head

Jack Sider

J. K. McElligott

Jack Sider, formerly executive vice president of The Loewenthal Co., Chicago, Ill., and Akron, O., old-established dealer in scrap rubber, was elected president of the company as of January 1, 1944, succeeding Edward B. Friedlander, who retired on that date. Mr. Sider has been active in the company's affairs for some 30 years and thus assumes the presidency with a thorough knowledge of the business and its ramifications. He will make his headquarters at the present offices at 188 W. Randolph St., Chicago; while J. K. McElligott, newly elected executive vice president, will be in charge of the Akron office.

The entire staff of the company will remain intact and includes J. A. Goldblatt, Morris Klein, Milton Loewenthal, Tim Gross, and Max Sider.

The Warren Featherbone Co., manufacturer of notions made of Koroseal, Three Oaks, Mich., has announced the election of Henry H. Cutler, vice president in charge of sales, to the presidency, succeeding Frederick W. Chamberlain, now chairman of the board.

R. C. Hill, for the past eleven years with United States Rubber Co., New York, N. Y., and lately as manager of a division of the manufacturer's sales department in the general offices, has become sales manager of the stove division of National Enameling & Stamping Co., Milwaukee, Wis.

NEW ENGLAND

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed Albert W. Hendrickson director of employe services, in charge of employment, first aid, training programs, employe magazine, cafeterias, and other personnel activities, at the company's three plants, at Ansonia, Derby, Conn., and Buffalo, N. Y. Mr. Hendrickson comes to Farrel-Birmingham from Kellett Aircraft Corp., Philadelphia, Pa., where he was director of industrial relations. Previously he had been with Collins & Aikman Corp., Philadelphia, as production superintendent and in other capacities. Mr. Hendrickson, a graduate of the University of Pennsylvania, was formerly a faculty member of Wharton School, Industry Department, University of Pennsylvania, teaching industrial relations and industrial research. He also taught classes in engineering, science, production supervision, and personnel management, and has conducted courses for the War Manpower Commission in job instruction training for training-within-industry groups.

Rhode Island rubber manufacturers in January employed 6,809 workers, 10.2% above the 6,178 in December and 37.1% more than in January, 1943. The payroll, however, for January, 1944, totaled $746,-000, down 4.5% from the $781,000 of December, but up 118.6% from that of the same month last year. During January the industry used 2,347,000 kilowatt hours, 0.3% less than the 2,354,000 used in December, but 35.8% more than the January, 1943, figure.

Goodyear Fabric Corp., New Bedford, Mass., has begun the work of renovating and reconditioning the long-idle Nyanza Mill at Woonsocket, R. I., which it recently leased. J. B. Murphy, representative of the Goodyear firm, is supervising the job.

Hycar Chemical Co., 335 S. Main St., Akron, through General Sales Manager Frank M. Andrews has announced that Roger C. Bascom has joined its technical service staff to serve New England, eastern New York, and northern New Jersey. As technical service engineer, Mr. Bascom will advise rubber manufacturing companies in the compounding and processing of Hycar synthetic rubber and will also work closely with engineers and designers at industrial concerns, aircraft manufacturing companies, textile manufacturers, shipyards, and others in the application of synthetic rubber products to their design and production problems. Mr. Bascom, whose headquarters are at Milford, Conn., previously was chief chemist of Standard Products Co. and prior to that had been with the Converse Rubber Co. and Rubatex Products, Inc.

CANADA

Canada Wire & Cable Co., Ltd., Leaside, Ont., last month elected James Y. Murdock president of the company, succeeding H. H. Horsfall. The latter, who resigned because of ill health, will continue as chairman of the board.

R. C. Berkinshaw, president, Polymer Corp., Sarnia, Ont., told the recent annual meeting of the Kent Motor Club at Chatham, Ont., that approximately 60% of Canada's program of conversion for uses of synthetic rubber has been completed. In some instances, he said, especially footwear, the conversion has reached 90%. Canadians have been using and wearing synthetic rubber products for some time, stated Mr. Berkinshaw, and in most cases have been unaware of the fact. The Polymer president believes that synthetic rubber has a definite place in the postwar world although it will have to stand on its own feet in competition with natural rubber products.

Dominion Rubber Co., Ltd., Montreal, P. Q., recently purchased property adjacent to its plant, Merchants Rubber Factory, at Kitchener, Ont., to fit into plans for future expansion.

Norman W. Smith has been appointed manager, sales and service, reclaimed rubber and dispersites, Dominion Rubber, according to M. F. Anderson, general manager, chemical and regenerating division of the company. A graduate of the University of Toronto, '38, Mr. Smith joined Dominion Rubber in 1939, and after a period of training in the general laboratories of the company on latex and reclaim problems, was transferred to the rubber regenerating plant in Montreal as technical supervisor.

John Symons, sales manager of the Dominion tire division, told a service club meeting February 3, in Toronto, Ont., that 15¢ a pound is the most optimistic postwar estimated price at which synthetic rubber can be produced; while natural rubber likely can be delivered in North America at 10-12¢ a pound. He forecast postwar reversion to natural rubber, with some possibility that blends of synthetic and natural rubber might produce a superior product.

Courtaulds (Canada), Ltd., announced January 29 that its Cornwall, Ont., plant will produce 12¾ million pounds of viscose rayon yarn during 1944, exceeding 1943 output by 27%, in order to meet growing American and Canadian demand for high-tenacity rayon to be used in manufacturing synthetic rubber tires for aircraft and military vehicles. In 1943 almost the entire output went into civilian manufacture; whereas this year, the company says, only 6¾ million pounds will be allotted to civilian purposes. Twenty-four new spinning machines are being installed to increase production capacity, and the following plant additions are being made: extra soda settling tanks; a cake storage building, 150 feet long by 22 feet wide, complete with large humidifying units; two large drying rooms with automatic heat and conditioning controls to deal with 120,000 pounds of yarn.

H. H. Bloom, administrator of farm and construction machinery, Wartime Prices & Trade Board, told the Ontario Crop Improvement Association convention in Toronto, Ont., February 8, that rubber tire requirements for tractors and combines in operation in Canada will depend upon the success of synthetic rubber production in Canadian plants. He also said WPTB will make it a point, however, to keep machines now being used in continued operation.

Jem Rubber Co., Toronto, Ont., has named G. F. Brown, formerly connected with the Northern Rubber Co., Woodstock, Ont., to the post of general manager in succession to Rex Lovell, who has assumed a similar position with John Stuart Sales Co. of Canada. Mr. Brown's new appointment became effective February 15. He was only recently discharged from the Canadian Army after serving for 4½ years and attaining the rank of captain.

British Rubber Co. of Canada, Ltd., Montreal, P. Q., has elected Chief Chemist A. Beverley Lewis a director of the company.

OBITUARY

W. Edwin Palmer

W. EDWIN PALMER, secretary and assistant treasurer of the Seiberling Rubber Co., Akron, O., died January 25 in Akron after a short illness following an operation. Born in Hudson, O., August 31, 1874, he attended high school and Western Reserve Academy there, then studied two years at Eastman College, Poughkeepsie, N. Y. Upon coming to Akron when 21, he first worked for a department store and then a fishing tackle concern. Mr. Palmer started as bookkeeper in the newly founded Goodyear Tire & Rubber Co., Akron, in January, 1899, won various promotions, and finally became secretary and assistant treasurer. Then when the Seiberlings, who had organized the Goodyear Company, started the Seiberling Rubber Co. in 1921, Mr. Palmer went with them as secretary and assistant treasurer.

The deceased, a 33rd degree Mason, Scottish Rite, was very active in all Masonic organizations and at his death had been Grand Recorder for the Ohio Knights Templar.

Funeral services were held January 28.

Survivors include the widow, a son, and six grandchildren.

Arthur D. Kunze

ARTHUR D. KUNZE, executive secretary of the mechanical rubber goods division, The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y., died February 1 at his home in Hastings-on-the-Hudson, N. Y., where he was born 44 years ago. Services were held at the Baker Funeral Home in Hastings, February 4, followed by interment in the Mt. Hope Cemetery, Greenburgh, N. Y.

Mr. Kunze's first business experience after graduation from the high school in Hastings-on-the-Hudson was in the executive traffic department of the New York Central Railroad. Then he joined The Rubber Manufacturers Association in January, 1920 and served it in various capacities. He resigned as secretary on June 30, 1930, to go to the mechanical rubber goods division of the United States Rubber Co. as assistant to the general manager of sales. Under the National Recovery Administration the deceased held the newly created position of secretary of the code authority, mechanical rubber goods industry. This position he had assumed when he rejoined the R. M. A. on February 1, 1934. Following termination of the NRA, Mr. Kunze was made chairman of the mechanical rubber goods division of the R. M. A. and on February 5, 1942, became executive secretary of the division. He was also a Mason. Mr. Kunze leaves his wife, his mother, two sons, a daughter, three sisters and a brother.

Roy Earl Demmon

ON FEBRUARY 14, at Daytona Beach, Fla., suddenly died Roy Earl Demmon, vice president and director of sales, Stauffer Chemical Co., 420 Lexington Ave., New York, N. Y., which he had joined in March, 1909, as a clerk in the bookkeeping department of the San Francisco, Calif., office. A few months later he became local division manager and in 1920 general manager of the firm's Houston, Tex., properties. To this duty was added in 1929 managership of the Indiana branch. Then in 1936, Mr. Demmon was made assistant vice president and in March, 1941, vice president and director of sales.

He was also a director of Old Hickory Chemical Co., Cornwall Chemicals, Ltd., Niagara Smelting Corp., Philadelphia Quartz Co. of California, New York-Ohio Chemical Corp., Nyotex Chemicals, Inc., and the Agricultural Insecticide & Fungicide Association. Besides he belonged to the Masonic Order, and the Siwanoy Country, Bronxville Field, Chemists, and Uptown clubs. He resided in Bronxville, N. Y.

The deceased was born in Sacramento, Calif., on August 4, 1891. He attended Lowell High School in San Francisco and the University of California.

Surviving are the widow and a son.

Mr. Demmon worshipped at the Reformed Church of Bronxville, where services were held February 18.

Julian W. Curtiss

AFTER a brief illness Julian Wheeler Curtiss, former executive of A. G. Spalding & Bros., Inc., New York, N. Y., died in Greenwich, Conn., on February 17. He had joined the sporting goods concern shortly after his graduation from Yale in 1879 and was made secretary and vice president in 1884, president in 1920, and chairman of the board in 1933; he retired in 1939, but continued as an advisory counsel.

Mr. Curtiss was born in Fairfield, Conn., 86 years ago. He was educated at Hopkins Grammar School, Brooklyn Polytechnic Institute, and Yale. For many years he was prominent in Greenwich civic affairs.

He is survived by his wife and two daughters.

Funeral services were held at Christ Church, Greenwich, February 19. Burial was in Putnam Cemetery.

Owen W. White

A HEART attack caused the death, on February 20, in Danbury, Conn., of Owen W. White, treasurer of the Fabric Fire Hose Co., Sandy Hook, Conn. Mr. White had formerly been an accountant for United States Rubber Co., New York, N. Y. He was born in Brooklyn, N. Y., 50 years ago. His wife survives him.

R. J. Schubert

ACCORDING to word from abroad, R. J. Schubert, 42, secretary of the Goodyear Tire & Rubber Co. of India, died from a fall from an office building in Calcutta shortly before his scheduled return to Akron, O. He had been in Calcutta about three years and with the Goodyear organization about eleven.

He leaves a wife and a son.

Services were held in Calcutta on January 26, followed by cremation. The ashes will be sent to this country.

Patents and Trade Marks

APPLICATION

United States

2,339,242. **For Packaging Food Materials, as Processed Cheese and the Like, a Sheet-Material Coated with a Composition Including a Wax-Compatible Film-forming Constituent Such as Natural and Synthetic Rubber, Gutta Percha, Balata, Chlorinated Rubber, and Isobutylene Polymers.** A. Abrams and G. W. Forcey, both of Wausau, and C. L. Wagner, Menasha, assignors to Marathon Paper Mills., Rothschild, all in Wis.

2,339,283. **Thin Rubber Goods.** A. Mendel, New York, N. Y.

2,339,287. **Portable Fuel Dispenser, Including Resilient Suction and Discharge Hose Lines.** F. E. Neel, Jr., United States Army.

2,339,409. **Electrically Heated Shoulder Pad Having Intermediate Section Constructed with Double Walls of Waterproof Material.** M. F. Joy, Green Island, N. Y., and E. E. Shepardson, East Providence, R. I., assignors to Colvinex Corp., Cohoes, N. Y.

2,339,546. **Nonstatic Tire.** E. E. Hanson, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,547. **Cleaning Article with a Body of Intercommunicating Cellular Rubber Embedded in and Extending through Which Is a Mass of Soft Annealed Steel Wool.** M. Carter, Trenton, N. J., assignor to Firestone Tire & Rubber Co., Akron, O.

2,339,548. **Self-Sealing, Bullet-Proof Inner Tube.** R. F. Wilson, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,549. **Shock Absorbing Washer Including an Apertured Rubber Body.** L. M. Kubaugh, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,556. **In an Expansion Joint Positioned between Two Spaced Members, a Latex Rubber Composition Bonded to Adjacent Surfaces of the Spaced Members by a Latex and Silicate Priming Coating.** H. W. Greenup, Barrington, R. I. and R. D. Byall, assignors to Firestone Tire & Rubber Co., both of Akron, O.

2,339,558. **Tire With a Tread in Which Are Arranged a Number of Circular Slits.** J. E. Hale, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,702. **Closure, Including an Elastic Packing Ring.** A. Isele, Neudorf, Switzerland.

2,340,295. **Milking Machine Teat Cup with a Shell and Tapered Flexible Inflation.** L. F. Bender, assignor to Universal Milking Machine Co., both of Waukesha, Wis.

2,340,296. **Teat Cup Inflation for a Milking Apparatus.** L. F. Bender, assignor to Universal Milking Machine Co., both of Waukesha, Wis.

2,340,298. **In an Adhesive Tape Having a Hydrophilic Regenerated Cellulose Backing and a Hydrophobic Rubber Base Adhesive Coating, an Intermediate Primer Coating of Polyvinyl Alcohol in Combination with a Rubber Derived from an Aqueous Dispersion.** H. J. Billings, South Acton, Mass., assignor by mesne assignments to Industrial Tape Corp., New Brunswick, N. J.

2,340,302. **Milk Strainer Including a Tank Having a Circular Bottom Portion Fitted with a Circular Foraminated Wall Which Forms an Internal Rise in Relation to the Tank, and a Toroidal Rubber Ring Gasket for the Base of the Rise.** D. O. Brant, Canoga Park, Calif.

2,340,332. **Brassiere with Elastic Insert.** R. E. Lafoon, San Diego, Calif.

2,340,415. **In a Clutch Which Includes a Driving and a Driven Member, an Annular Body of Rubber Vulcanized and Bonded between the Driving Member and an Outer Sleeve.** C. M. Eason, Waukesha, Wis.

2,340,542. **Vertical Electric Motor Driven Centrifugal Machine, with Vertically Extending Rubber Shock Absorber Elements.** J. W. Lubberhuizen, Lobositz, Germany; vested in the Alien Property Custodian.

2,340,578. **Shoe.** W. F. Cairns, North Haven, Conn., assignor to United States Rubber Co., New York, N. Y.

2,340,642. **In an Electrode Assembly, a Tube Having in Its Side an Orifice, and a Circumambient Rubber Band Engaging the Tube and Overlying the Orifice.** A. E. Cameron, Racine, Wis., assignor to B. D. Eisendrath Tanning Co., Chicago, Ill.

2,340,774. **Cigar Wrap of Rubber Hydrochloride Film.** J. E. Snyder, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

Dominion of Canada

417,633. **Submersible Container for Transporting Goods Having a Casing Divided into Compartments, the End Compartments Provided with Inflatable Balloonettes.** I. R. J. Mumford, Welwyn, Hertford, England.

417,660. **Stiffening Material for Shoes Consisting of a Porous Fabric Impregnated with a Polyester-Polyamide Derivative.** Celastic Corp., assignee of P. R. Austin, both of Wilmington, Del., and Q. L. Quinlivan, East Orange, N. J., both in the U. S. A.

417,668. **Glass Fabric Coated with a Composition of Chlorinated Rubber, Magnesium Ammonium Phosphate, Plasticizer, and Pigment.** Columbus Coated Fabrics Corp., Columbus, O., assignee of A. S. Hyatt, Bexley, Calif., and T. J. Kerr, Worthington, O., all in the U. S. A.

417,707. **Adhesive Tape Sheet.** Minnesota Mining & Mfg. Co., assignee of W. Kellgren, H. J. Tierney, and R. G. Drew, all of St. Paul, Minn., U. S. A.

417,722. **In a Sound Recording and Reproducing Device, Friction Drive Wheels, the Outer Portions of Which Are of Rubber.** B. A. Proctor Co., New York, assignee of B. A. Proctor, Larchmont, and F. C. W. Thiede, Hempstead, all in N. Y., U. S. A.

417,766. **Girdle.** L. J. A. Amyot, Quebec, P. Q.

417,838. **Sectional Airbag Including a Hollow Rubber Core and Wire-Reenforced Covering.** Firestone Tire & Rubber Co., assignee of R. F. Wilson, both of Akron, O., U. S. A.

417,839. **Pneumatic Tire with Tread Having Circumferentially Extending, Serrated Ribs Separated by Intervening Grooves.** Firestone Tire & Rubber Co., Akron, assignee of A. Hargraves, Silver Lake Village, and J. W. Liska, Akron, both in O., U. S. A.

417,840. **Pneumatic Tire, Including Conducting Element.** Firestone Tire & Rubber Co., assignee of E. E. Hanson, both of Akron, O., U. S. A.

417,853. **Adhesive Tape Including a Flexible Sheet Coated with a Mixture Containing an Aqueous Dispersion of Rubber.** Kendall Co., Boston, assignee of W. Eustis, Newton, both in Mass., and G. R. Orrill, Western Springs, Ill., both in the U. S. A.

417,882. **Shoe Stiffener Including a Fibrous Sheet Impregnated with a Formaldehyde Condensation Product of the Aminoplast Type.** Society of Chemical Industry in Basle, assignee of Henri Gruenberg, both of Basle, Switzerland.

417,895. **Suspenders of Elastic Material.** H. J. Bayon, Angers, France.

417,934. **Bathing Cap.** W. W. Winsen, Johannesburg, Transvaal, South Africa.

418,009. **Tire.** B. F. Goodrich Co., New York, N. Y., assignee of F. R. McKelvey, Cuyahoga Falls, O., U. S. A.

418,025. **Electric Power Cable, Including a Liquid Resisting Barrier Consisting of a Filling of Insulating Material in the Worming Spaces between the Cores and a Polymerized Filling in the Insulation around the Conductors of the Cores.** Northern Electric Co., Ltd., Montreal, P. Q., assignee of International Standard Electric Corp., New York, N. Y., U. S. A., assignee of J. K. Webb, London, England.

418,079. **Continuous Track for a Tracklaying Vehicle, Including Reenforcing Means to Which Is Vulcanized an Endless Rubber-Like Body, and Transverse Members Having Rubber-Like Tread Shoes.** Wingfoot Corp., Wilmington, Del., assignee of K. B. Kilbron, Akron, O., both in the U. S. A.

418,162. **Electric Insulating Material in Which Glass Filaments Are Embedded in an Impregnant Including a Binding Agent Primarily Consisting of Polystyrene.** International Standard Electric Corp., New York, N. Y., U. S. A., assignee of T. R. Scott and A. A. New, both of London, England.

418,163. **Insulating Material Consisting of a Dense Mass of Binding Agent, Primarily Polymerized Styrene, and Powdered Inorganic Dielectric Particles.** International Standard Electric Corp., New York, N. Y., U. S. A., assignee of T. R. Scott and A. A. New, both of London, England.

418,227. **Cloth Cleaner for Sieves Including a Unitary Member Molded from Synthetic Plastic Material.** B. F. Gump Co., assignee of W. M. Williams and E. G. Berry, all of Chicago, Ill., U. S. A.

PROCESS

United States

2,339,452. **Molding Plastic-Slugs.** J. Bailey, West Hartford, and R. S. Jesionowski, assignors to Plax Corp., both of Hartford, both in Conn.

2,339,559. **Restoring Curing Bags.** J. E. Charnes, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,683. **Making Retractile Cord by Continuously Extruding Vulcanizable Material on a Conductor, Subjecting to Continuous Vulcanization, Coiling the Cord into a Helical Retractile Form, and Heating the Cord to Set It in the Form.** T. K. Cox, Randallstown, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,340,357. **Treating Fabrics by Immersion in an Aqueous Bath of an Agglomerated Latex Composition.** H. A. Young, Westfield, N. J., assignor to United States Rubber Co., New York, N. Y.

2,340,358. **Treating Fabrics by Immersion in an Aqueous Bath of an Agglomerated Dispersion of Water-Insoluble Synthetic Resin.** H. A. Young, Westfield, N. J., assignor to United States Rubber Co., New York, N. Y.

2,340,392. **Making Corrugated Rubber Mats.** L. H. Lefcourt, New York, N. Y.

2,340,834. **Forming Finely Divided Particle of Polymeric Vinylidene Chloride into Shaped Bodies.** A. W. Hanson, assignor to Dow Chemical Co., both of Midland, Mich.

Dominion of Canada

417,664. **Molding Laminae of Creped Webs in Association with a Synthetic Resin by Plastic Flow so that the Webs are Stretchable and Retain Their Integrity as Webs.** Cincinnati Industries, Inc., Lockland, assignee of W. W. Rowe, Indian Hill, both in O., U. S. A.

417,805. **Coating the Interior Surface of a Vitreous Lamp Envelope with Powdered Fluorescent Material in a Solution of Polymerized Styrene.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of J. T. Anderson, Rugby, Warwick, England.

417,806. **Coating Metal Wire with a Mixture Including a Superpolyamide Modified by an Alkyd Resin.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of W. J. Scheiber, Schenectady, N. Y., U. S. A.

417,807. **Coating a Metal Wire with a Flexible, Tightly Adhering Superpolyamide Composition.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of W. J. Scheiber, Schenectady, N. Y., U. S. A.

417,875. **Forming Double-Wall Bags of Sheets of Rubber Hydrochloride.** Shellmar Products Co., assignee of P. M. Gilfillan and I. Gurwick, all of Mt. Vernon, O., U. S. A.

417,876. **Lining Textile Hose with Rubber Latex or the Like.** Sillick Holding Co., Ltd., Newcastle-upon-Tyne, Northumberland, England, assignee of D. E. F. Canney and M. Balkin, both of Bentham, Lancaster, England.

418,059. **Providing a Liquid Resisting Section in an Impregnated Multi-Conductor Cable.** Western Electric Co., Inc., New York, N. Y., U. S. A., assignee of E. D. Bent, Montreal, P. Q.

418,078. **Laminating a Plurality of Plies of Rubber Hydrochloride Film.** Wingfoot Corp., Wilmington, Del., assignee of G. DeWitt Mallory, Akron, O., both in the U. S. A.

418,102. **Making Artificial Leather by Impregnating a Fleece of Cotton Fiber with a Bath Including Latex, Aqueous Casein Solution, Aqueous Suspension of Soya Bean Flour Including Sulphonated Oil as Wetting Agent, and Sulphur.** G. Ganz, Bristol, England.

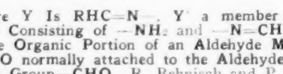
CHEMICAL

United States

2,339,237. **Improved Polyamide Composition Having a Relatively High Melting Point and Enhanced Affinity for Dyestuffs.** M. M. Brubaker, Boothwyn, Pa., and D. D. Coffman and F. C. McGrew, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,339,314. **Resinous Condensation Products Obtained by Condensing an Aldehyde with a Five-Membered Heterocyclic Ring Compound Selected from the Group Consisting of 2-Aminothiazole, 4-Methyl-2-Aminothiazole, 4-Phenyl-2-Aminothiazole, 4-Methyl-2-Phenyl-Aminothiazole and 2-Mercapto-4-Hydroxythiazole.** W. Zerweck and M. Schubert, both of Frankfurt, a. M., Germany; vested in the Alien Propery Custodian.

2,339,318. **A Diaminodiphenylsulphone Derivative Having the Formula**



Where Y Is RHC=N—, Y' a member of the Class Consisting of —NH_2 and —N=CHR, and R the Organic Portion of an Aldehyde Molecule RCHO normally attached to the Aldehyde Functional Group—CHO. R. Behnisch and P. Pöhls, both of Wuppertal-Elberfeld, Germany, assignors to Winthrop Chemical Co., Inc., New York, **N. Y.**

2,339,362. **In the Production of an Olefin-Sulphur Dioxide Resin, the Improvement Comprising Treating the Resin with Vapors of an Organic Solvent under Such Conditions of Temperature, Pressure, and Time of Contact, as to Produce Softening and Swelling of the Resin Particles without Substantial Agglomeration of the Particles.** R. D. Snow, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

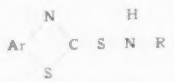
2,339,387. **Electrical Insulating Plastic Composition Including a Mixed Polymerizate of Vinyl Acetate and Vinyl Chloride.** R. Endres, Dessau-Rosslau, Germany; vested in the Alien Property Custodian.

2,339,428. **Controlled Reduction of the Acid Number of Polymerized Rosin of the Type Having an Acid Number above 140, by Heating at Esterification Temperatures with from 2% to 5% Glycerin.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,339,429. **Stabilizing Oxidized Monocyclic Terpenes by Subjection to the Action of a Compound of a Group VIII Metal Selected from the Group Consisting of the Oxides and Salts thereof.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,339,493. **Condensing a Halogenated High Molecular Weight Aliphatic Material Having More Than 10 Carbon Atoms and Containing at Least 15% Halogen with an Aromatic Compound to Make a Higher Molecular Weight Condensation Product.** E. Lieber, West New Brighton, S. I., N. Y., and M. M. Sadlon, Roselle Park, N. J., assignors by mesne assignments to Standards Catalytic Co., Wilmington, Del.

2,339,552. **Vulcanizable Rubber Composition Including a Vulcanizing Agent and a Substance Having the Formula**



Wherein Ar Is an Orthoarylene Radical and R One of a Group Consisting of Hydrogen, Acyclic Alkyl Radicals, Amino-Substituted Alkyl Radicals and Arylenethiazylthio-Amino-Substituted Alkyl Radicals. E. L. Carr, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,621. **Condensation Product Obtained by the Reaction of Melamine, Formaldehyde and an Organic Compound of the Formula RHNCYNR (CHR'NRCYNR)nH, Where Y Is a Member of the Class Consisting of Oxygen and Sulphur, R' a Member of the Class Consisting of Hydrogen and Monovalent Hydrocarbon Radicals of not More Than 6 Carbon Atoms, R a Member of the Class Consisting of Hydrogen, Monovalent Hydrocarbon Radicals and Monovalent Halogeno-Substituted Hydrocarbon Radicals, and n is an Integer and at Least 1 and not More Than 2.** G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., New York, N. Y.

2,339,622. **Condensation Product Obtained by the Reaction of Ingredients Including an Aldehyde and a Bis-triazine Derivative Corresponding to the Formula**

$$CY[NR'CHR'NR'C_3N_3(NHR)_2]_2$$

Where Y Is a Member of the Class Consisting of Oxygen and Sulphur, R' a Member of the Class Consisting of Hydrogen and Monovalent Hydrocarbon Radicals of not More Than 6 Carbon Atoms, and R a Member of the Class Consisting of Hydrogen, Monovalent Hydrocarbon Radicals, and Monovalent Halogeno-Substituted Hydrocarbon Radicals. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., New York, N. Y.

2,339,623. **Condensation Product of Aldehydes and Carbamidomethylamino Triazines.** G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., New York, N. Y.

2,340,321. **Producing Rubber Conversion Products by Mixing Rubber, an Acid Sulphate, and a Weak Acid, Forming the Mixture into Relatively Thin Section, and Heating.** T. R. Griffith, Ottawa, Ont., Canada.

2,340,388. **Producing Valuable Ketones of Steroids and Their Enol Derivatives Respectively, by Subjecting Ketones of Steroids Polyhalogenated in the Ring System to the Action of Agents Capable of Splitting off Halogen Hydride.** H. H. Inhoffen, Berlin-Wilmersdorf, and A. Bitenandt, Berlin-Lichterfelde, both in Germany and E. Schwenk, Montclair, assignors to Schering Corp., Bloomfield, both in N. J.

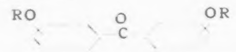
2,340,413. **In the Production of High-Quality Coumarone-Indene-Type Resins by Continuous Catalytic Polymerization of a Coumarone-Indene Resin Oil, the Step of Recycling a Controlled Proportion of the Polymerization Reaction Product Back to the Polymerization Reaction Zone.** E. L. Cline, Philadelphia, Pa., and D. F. Gould, Riverton, N. J., assignors by mesne assignments to Allied Chemical & Dye Corp., New York, N. Y.

2,340,426. **Molding Material from the Coffee Bean.** H. S. Polin and A. I. Nerken, both of New York, N. Y., Nerken assignor to Polin.

2,340,452. **Adhesive Including a Base, an Adherent Film of One Part or two Parts of Polymerized Ethylene and one Part of a Cyclorubber, and a Surface Film of Polymerized Ethylene.** C. L. Child, R. B. Fisher, F. Clarke, and B. J. Habgood, Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,340,482. **A Blend of Polyvinyl Acetal and a Mixed Ester of a Glycol and Two Saturated Aliphatic Mono-carboxylic Acids, One of Which Contains Two to Five Carbon Atoms and the Other of Which Contains Six to Twelve Carbon Atoms.** W. H. Lycan, Milwaukee, Wis., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

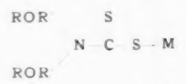
2,340,528. **Producing Condensation Products by Reacting with Methylol Compounds of the Amides of Organic Acids of the Class of Fatty and Hydroxyfatty Acids, the Phenylacetic and Phenylhydroxyacetic Acids, the Benzoic and Hydrobenzoic Acids, the Carbamic Acids and Alkoxycarbonic Acids on Compounds of the Following Formula**



Wherein O/C Stands for a Five-Membered Ring Containing Four Carbon Atoms and One Hetero Atom of the Group Consisting of Oxygen and Nitrogen, and R Stands for a Substituent Selected from the Class Comprising Hydrogen, Alkyl, and Acyl. E. Haack, Radebeul, Germany; vested in the Alien Property Custodian.

2,340,584. **Producing P-Sulphonamide-Benzene-Azo-Naphthol Sulphonic Acids.** M. Dohrn, Berlin-Charlottenburg, and P. D. Finkenkrug, Osthavelland, both in Germany, assignors to Schering Corp., Bloomfield, N. J.

2,340,650. **Vulcanizing Rubber in the Presence of an Accelerator Which Is a Dithiocarbamic Acid Derivative Having the Formula**



Wherein R Is an Alkyl Radical, R' an Alkylene Radical Which Separates the Oxygen Atom from the Nitrogen Atom by at Least Two Carbon Atoms, M Is a Heavy Metal, and n the Valence of M. R. T. Dean, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,340,661. **Vulcanizing Rubber in the Presence of an Accelerator Comprising the Composite Reaction Product of an Amino Thio Thiazole with a Methylol Carbamide Obtained by Moderate Heating of an Intimate Mixture of the Reactants.** M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

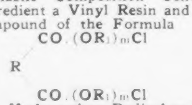
2,340,699. **Composition of Shellac and a Synthetic Rubber Prepared by Copolymerizing a Butadiene-1,3 Hydrocarbon and an Acrylic Nitrile.** D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,340,833. **Producing a Resin-Like Amorphous Addition Compound by Heating to Fusion a Non-Aqueous Mixture of Diaryl Guanidine Hydrochloride and Zinc Oxide.** A. R. Davis, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,340,838. **Producing a Hard Resinous Light-Colored Composition by Reacting Phenol with a Chlorinated Petroleum Wax.** F. P. Otto and O. M. Reiff, Woodbury, N. J., assignors to Socony Vacuum Oil Co., New York, N. Y.

Dominion of Canada

417,658. **Plastic Composition Containing as Essential Ingredient a Vinyl Resin and as a Plasticizer a Compound of the Formula**



Where R Is a Hydrocarbon Radical to Which the Carbonyl Groups Are Attached at Adjacent Carbon Atoms, R_1 is a Noncyclic 1,2 Alkylene Radical of from 2 to 4 Carbon Atoms, and m Is an Integer from 1 to 3. Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of T. F. Carruthers, South Charleston, and C. M. Blair, Charleston, both in W. Va., U. S. A.

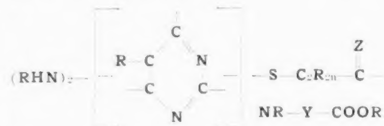
417,676. **Closure Composition Having a Sealing Layer Deposited from a Vulcanizable Rubber Dispersion, the Layer Substantially Devoid of Free Sulphur.** Crown Cork & Seal Co., Inc., assignee of L. J. DeHolczer, both of Baltimore, Md., U. S. A.

417,740. **Process for the Separation of Isoprene and Piperylene Individually from a Mixture Containing Isoprene, Piperylene and Cyclopentadiene.** United Gas Improvement Co., Philadelphia, assignee of A. L. Ward, Drexel Hill, both in Pa., U. S. A.

417,760. **Process Comprising Reacting upon a Nitrile of the General Formula $R_1R_2CH.CN$, Wherein R_1 and R_2 Represent Aryl Radicals with a Basically Substituted Alkyl Halide in the Presence of an Agent Capable of Causing Splitting off of Hydrogen Halide.** M. Bockmuhl and G. Ehrhart, both of Frankfurt-am-Main-Hoechst, Germany.

417,804. **Resinous Composition Comprising the Product of Reaction of an Aliphatic Aldehyde and Malonic Diamide.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio, Pittsfield, Mass., U. S. A.

417,811. **Reaction Product of Ingredients Including an Aldehyde and a Compound Corresponding to the General Formula**



Where n Represents an Integer and Is at Least 1 and not More Than 2, Z Represents a Member of the Class Consisting of Oxygen and Sulphur, Y Represents a Divalent Carbocyclic Radical, and R Represents a Member of the Class Consisting of Hydrogen and Monovalent Hydrocarbon and Halo-Hydrocarbon Radicals. Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. F. D'Alelio, Pittsfield, Mass., U. S. A.

417,812. **Coating Including Crystalline Synthetic Linear Polyamide Having a Molecular Weight above 3000 and, as a Heat Stabilizing Agent therefor, a Fusible, Non-Heat-Hardening Phenol-Formaldehyde Resin Selected from the Class Consisting of a Para Tertiary-Butylphenol-Formaldehyde Resin and Ortha-Cyclohexylphenol-Formaldehyde Resin.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. M. Brubaker, Boothwyn, Pa., U. S. A.

417,813. **Resin Composition Which Is a Reaction Product of a Polybasic Acid Anhydride and Terpinene, and a Hydrocarbon Resin.** Canadian Kodak Co., Ltd., Toronto, Ont., assignee of I. C. Matthews and W. F. Lynch, both of Rochester, N. Y., U. S. A.

417,822. **Coating Composition Including a Colloidal Combination of a Vinyl Resin with a Substantially Water-Immiscible Organic Liquid Composition Which Is a Solvent for the Vinyl Resin at Elevated Temperatures below Its Boiling Point.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of A. K. Doolittle, South Charleston, W. Va., U. S. A.

417,845. **Cheese-Coating Composition Including an Amorphous Wax and up to 30% of a Thermoplastic Condensation Product Obtained by Reacting Rubber with an Amphoteric Metal Halide.** Industrial Patents Corp., assignee of J. D. Ingle and L. D. Mink, all of Chicago, Ill., U. S. A.

417,991. **For Coating Metal Surfaces of Iron and Tinplate, a Resin Resulting from Joint Polymerization of Vinyl Chloride and Vinyl Acetate, together with a Stabilizer, Which Belongs to the Group of Acid Phosphates and Sulphides.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of A. K. Doolittle, South Charleston, W. Va., U. S. A.

417,992. **Coating Composition for Metals, Consisting of a Conjoint Polymer of a Vinyl Halide with a Vinyl Ester of a Lower Aliphatic Acid Combined with a Polymerized Lower Fatty Alcohol Ester of the Group Consisting of Acrylic and Methacrylic Acids.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of G. M. Powell, III, Charleston, W. Va., U. S. A.

418,004. **Producing Cellular Rubber-Like Material from Aqueous Dispersions of Rubber.** Dunlop Rubber Co., Ltd., London, England, assignee of A. D. Taylor and D. W. Pounder, both of Birmingham, Warwick, England.

418,186. **Cellulosic Material in Which a Fiber Base Is Impregnated with Latex Peptized with a Hydrolized Protein.** Tanide Products Corp., Watertown, assignee of R. C. McQuiston, West Newton, both in Mass., U. S. A.

418,210. **Producing a Water-Insoluble Resin, with Anion-Exchange Properties, by Reacting a Polyalkylene Polyamine, an Aldehyde, and a Ketone.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of J. R. Little, Clifton, N. J., U. S. A.

MACHINERY

United States

2,339,443. **Injection Molding Machine for Forming Internally Threaded Articles.** G. C. Wilson, assignor to Armstrong Cork Co., both of Lancaster, Pa.

2,339,451. **Means for Forming a Sheet of Solvent-Free Organic Thermoplastic Material, Including a Nozzle for Extruding the Plastic in the Form of a Flat Ribbon, Means for Gripping and Stretching the Ribbon Transversely to Widen It and Reduce Its Thickness, Means for Heating the Ribbon and for Regulating the Heat.** J. Bailey, West Hartford, and R. S. Jesionowski, assignors to Plax Corp., both of Hartford, both in Conn.

A 10% Saving In Natural Rubber and GR-S

SUN RUBBER PROCESSING OILS

Also Provide Better Softening . . . Eliminate Oil Bloom

Any saving in rubber stocks, whether natural or synthetic, is a contribution to Victory. When such a saving is combined with improvement of the product, it is an achievement of which any manufacturer may be proud. Such was the recent accomplishment of a large manufacturer of essential mechanical rubber goods.

Surface Bloom, making the stock difficult to handle, had been traced to the softening agent being used with both natural rubber and GR-S. Following successful tests, this manufacturer changed to the use of Circo Light Processing Oil.

Oil Bloom was eliminated and the superior softening qualities of Circo Light Processing Oil permitted the use of less oil with a resulting increase in the tensile strength of the finished products.

An estimated 10% saving in natural rubber and GR-S was made possible in certain of the products by the use of Circo Light Processing Oil.

Such improvement in quality of products and economy of vital materials has been demonstrated in many similar cases.

Why not consult a Sun Engineer on your own compounding and production problems? Write to . . .

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SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

2,339,543. **Collapsible Sectional Drum for Tire Casings.** E. L. Bishop, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,551. **Tire Building Apparatus.** H. D. Stevens, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,553. **Tire Vulcanizer.** G. P. Bosomworth and E. S. Heck, assignors to Firestone Tire & Rubber Co., all of Akron, O.

2,339,557. **Apparatus for Drying a Continuous Moving Web of Material.** W. T. Runals, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,611. **Apparatus to Vulcanize a Product in a Continuous Length.** H. T. Battin, Ridgewood, N. J., assignor to United States Rubber Co., New York, N. Y.

2,340,401. **Tear Tester for Rubber Stocks.** F. A. Martin, assignor to Hoover Co., both of North Canton, O.

2,340,692. **Tire Repair Vulcanizer.** A. Ridd, Louisville, Ky.

Dominion of Canada

417,687. **Tire Building Apparatus.** B. F. Goodrich Co., New York, N. Y., assignee of F. S. Sternad, Cuyahoga Falls, and J. P. Sapp, Kent, both in O., both in the U. S. A.

418,076. **Belt Making Apparatus.** Wingfoot Corp., Wilmington, Del., assignee of J. F. Stalter, Akron, and A. E. McCoy, Stow, both in O., both in the U. S. A.

418,117. **Machine to Separate Fabric Fragments from Rubber Fragments.** T. J. Masse, Alexandria, New South Wales, Australia.

UNCLASSIFIED

United States

2,339,381. **Tractor Valve.** J. C. Crowley, Cleveland Heights, assignor to Dill Mfg. Corp., Cleveland, both in Ohio.

2,339,544. **Single-Walled Container.** L. O. Stanley, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,550. **Tire Inspection.** G. P. Bosomworth, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,339,718. **Tire Balancer.** M. Perrat, San Mateo, Calif.

2,340,503. **Disengageable Connection for Two Axially Alined Rubber-Metal Bushings.** B. Berenyi, Boblingen, Germany; vested in the Alien Property Custodian.

2,340,586. **Tool for Removing Tires from Wheel Rims.** S. Freed, Danbury, Conn.

TRADE MARKS

United States

405,256. **Prolatex.** Rubber preservative. Transmotive Laboratories (Samuel Davis), Chicago, Ill.

405,358. **Alsite.** Clay used in the manufacture of rubber, paper, ceramics. Georgia Kaolin Co., Elizabeth, N. J.

405,399. **Youngchap.** Clothing, including rain coats. Harry Myers & Co., Inc., Baltimore, Md.

405,412. Representation of double circle containing sketch of mechanical drawing implements. Pencils, erasers, etc. Metropolitan Technical Schools, Inc., New York, N. Y.

405,501. **Sinudrene.** Nasal sprays. Davart Products Co., Ashland, Ky.

FINANCIAL

The General Tire & Rubber Co., Akron O. Year ended November 30, 1943: net profit, $1,740,084, equal to $2.75 a common share, compared with $1,382,963, or $2.37 a share, in the preceding fiscal year; sales, $51,987,521, a record figure, against $32,944,784; current assets, $17,632,325, against $14,979,110; current liabilities, $4,238,219, against $4,935,302.

Hercules Powder Co., Wilmington, Del. For 1943: net earnings, $5,704,511, equal, after $524,928 in preferred dividends, to $3.93 each on 1,316,710 common shares outstanding, contrasted with $5,546,980, or $3.81 a common share, in 1942; provision for contingencies, $1,100,000, against $1,500,000; net sales and operating revenues, $122,518,626 (a new high), against $114,378,235.

Sun Oil Co., Philadelphia 3, Pa., and subsidiaries. For 1943: consolidated net income, $13,353,524, equal, after preferred dividend requirements, to $4.56 a share on the outstanding common stock, contrasted with $8,671,050, or $2.91 a share, in 1942.

United Carbon Co., Charleston, W. Va., and subsidiaries. For 1943: net income, $2,047,327, equal to $5.15 a share, compared with $1,780,520, or $4.47 a share, in 1942; net sales, $11,394,908, against $10,314,859; provision for contingencies, $300,000, against $100,000; tax provision, $1,020,000, against $1,669,200.

United States Rubber Co., New York, N. Y., and subsidiaries. For 1943: Consolidated net income, $14,163,554, equivalent, after allowing for $8 a share on the preferred stock, to $5.09 a common share, contrasted with $8,381,011, or $1.82 a common share, in 1942; consolidated net sales, $422,271,343 (a record high), against $290,992,037; taxes, $59,193,095, against $26,473,955; current assets, including $34,803,321 cash, $154,260,077, against $14,996,319 and $138,670,730 respectively, at the close of 1942; accounts and notes receivable from customers, less reserves for doubtful accounts of $2,095,670, $47,855,054, against comparable sums of $1,843,723 and $39,647,730 in the previous year; inventories, $69,580,780, against $78,127,630; working capital, $108,877,046, against $103,158,773; current liabilities, including accounts payable of $16,171,233, $45,383,031, compared with $17,646,993 and $35,511,957, respectively, in 1942; accrued federal income taxes and provision for renegotiation, $47,803,262. First mortgage and collateral trust 3⅝% bonds, the only funded debt of the company, totaled $31,725,000 on December 31, 1943, a further reduction of $2,838,000 from the 1942 total.

New Jersey Zinc Co., New York, N. Y. For 1943: net income, $6,884,725, equal to $3.50 a share, against $7,231,396, or $3.68 a share, the year before.

Philadelphia Insulated Wire Co., Philadelphia, Pa. For 1943: net profit, $16,594, equal to $1.21 a share, against $32,905, or $2.38 a share, in 1942.

Foreign Trade Opportunities

The following firms in Brazil wish to export to the United States:

Carnauba Wax, Cotton, Vegetable Oils, Fibers, Milkweed, and Minerals. F. Brito Bastos & Cia., Rua Major Facundo, 364, Fortaleza, Ceará.

Braids, Fringes, Trimmings, and Elastics. Tecelagem e Passamanaria Tijuca Ltda., Rua da Gratidão, 68, Rio de Janeiro.

Cotton and Cotton By-Products, Textiles in General. Cia. Comissária e Exportadora do Sul, Rua Alvares Penteado, 139, São Paulo.

The following companies wish to import from the United States:

Agricultural Equipment and Accessories, Sugar and Textile Mills Machinery, Chemical Products, Pharmaceutical Laboratory Equipment. Sociedade Importadora de Produtos Industriais Ltda., Rua Vigario Tenório, 193, Recife, Pernambuco, Brazil.

Machinery in General, Tools, Electrical Equipment, Zinc, and Sulphur. Organização Comercial e Industrial Fermaço Ltda., Edificio Vincentina, Rua Braulino Gomes, 25, São Paulo, Brazil.

Anilines and Chemical Products for Industries. F. Brito Bastos & Cia.

The concerns below are interested in representing American companies in Brazil:

Fabrica Brugni, Rua 7 de Setembro, 197, Salvador, Baia.

R. L. Silva, Caixa Postal 195, Recife, Pernambuco.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Belden Mfg. Co.	Com.	$0.30 reduced	Mar. 2	Feb. 17
Boston Woven Hose & Rubber Co.	Com.	0.50 q.	Feb. 25	Feb. 15
Canada Wire & Cable Co., Ltd.	A	1.00 q.	Mar. 15	Feb. 29
Canada Wire & Cable Co., Ltd.	B	0.25	Mar. 15	Feb. 29
Canada Wire & Cable Co., Ltd	Pfd.	1.625 q.	Mar. 15	Feb. 29
Detroit Casket & Mfg. Co.	Pfd.	0.30 q.	Mar. 1	Feb. 15
Goodyear Tire & Rubber Co.	Com.	0.50	Mar. 15	Feb. 15
Okonite Co.	6% Pfd.	1.50 q.	Mar. 1	Feb. 15
Raybestos-Manhattan, Inc.	Com.	0.375	Mar. 15	Feb. 29
Tyer Rubber Co.	6% Pfd.	1.50 q.	Feb. 15	Feb. 4
United Elastic Corp.	Com.	0.35	Mar. 10	Feb. 18
United States Rubber Co.	8% Pfd.	2.00	Mar. 10	Feb. 25
United States Rubber Co.	8% Pfd.	2.00	June 9	May 26
United States Rubber Co.	Com.	0.50	Mar. 10	Feb. 25

Rims Approved and Branded by The Tire & Rim Assn., Inc.

Rim Size	Jan., 1944
15" & 16" D. C. Passenger	
16x4.00E	64,423
16x4.25E	5,488
16x4.50E	19,826
16x5.00F	2,454
15x5.50F	4,449
16x6.00F	1,925
17" & Over Passenger	
18x2.15B	5,658
Flat Base Truck	
20x4.33R (6")	50,873
15x5.00S (7")	6,380
18x5.00S (7")	343
20x5.00S (7")	357,377
20x6.00T (8")	83,595
22x6.00T (8")	3,114
20x7.33V (9-10")	36,293
24x7.33V (9-10")	1,150
19x8.37V (11")	1,035
20x8.37V (11")	626
Semi D. C. Truck	
16x4.50E	4,665
15x5.50F	3,803
16x5.50F	20,113
Tractor & Implement	
15x3.00D	9,947
16x3.00D	976
19x3.00D	13,534
18x5.50F	3,434
20x5.50F	245
24x5.50R	731
24x6.00S	1,678
24x8.00T	1,112
W8-24	4,690
W8-38	4,020
W10-28	2,203
W10-38	2,600
W11-26	2,176
DW9-38	15,654
DW10-26	1,692
DW10-38	9,034
DW11-38	1,569
DW12-26	2,079
DW12-30	1,098
Cast	
24x15.00	41
Total	752,103

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The Fawick Airflex Principle consists of a rubber and cord gland, which expands against the driven rim, under controlled air pressure. No arms, levers or toggles—no adjustments to make—no lubrication required. Shocks and vibration absorbed by a cushion of air.

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A hundred new Diesel-powered tugboats are now being built by U. S. Army Engineers—each equipped with the Fawick Airflex Clutch.

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FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR

EUROPE

SOVIET RUSSIA

Thermoprene from Sodium Butadiene Rubber

Accepting the fact that synthetic rubber differs from natural rubber in various respects, Russian chemists appear to have planned at least their earlier investigations with a view to discovering the exact extent and direction of these differences and have accordingly almost from the outset attempted to do with their synthetic rubbers whatever it was possible to do with natural rubber. Thus in 1934, B. V. Bizov was trying to make thermoprene from Sodium divinyl rubber and comparing his product with thermoprene made from natural rubber. In his tests he used a natural rubber thermoprene obtained by incorporating 30% (on the weight of the rubber) of sulphonaphthenic acid in the rubber and heating to 180° C. for three to six hours in a thermostat.

At first it was attempted to treat synthetic rubber in exactly the same way, but heating conditions (duration and temperature) effective for natural rubber produced no marked changes in the synthetic rubber, which only softened somewhat, hardening to a leather-like mass on cooling. Prolonged heating produced gradual carbonization, but no signs of conversion. When tests were conducted in a metal vessel over an open fire, decomposition set in rapidly, accompanied by volatilization of gaseous reaction products which ignited, and practically the entire mass burned. Subsequently heating was carried out in closed (not hermetically) vessels, and care was taken to avoid ignition, when considerable quantities of converted rubber were obtained in the form of a black fluid which hardened into a shiny sheet when cooled and outwardly resembled thermoprene from natural rubber.

To determine the role of the ingredients in making thermoprene, experiments were then made with pure, unmilled natural rubber, sodium-butadiene rubber, and butadiene rubber obtained from petroleum by Bizov's method.

As is known, natural rubber heated at temperatures over 160° C. changes into a viscous, semi-fluid mass which does not set when cooled. The synthetic rubbers required much higher temperatures before decomposing, and the products obtained were very similar in appearance to those obtained from the synthetic mixes containing sulpho-naphthenic acid; the only difference was that the fracture showed a lighter color. A comparison of these products which, because of their properties, were called thermoprenes, with natural rubber thermoprenes, is given below:

Sodium Butadiene Thermoprene	Natural Rubber Thermoprene
At room temperature, black shining mass, fracture brown, easily reduced to powder. When heated above 80° C. it melts easily, changing into a black, mobile fluid. While hot, can be drawn into thin threads.	At room temperature, black shining mass, fracture also black, hard to pulverize. When heated above 90° C. it melts, gradually changing into a black fluid, retaining some structure. While hot, can be drawn into fine threads.
Does not saponify.	Does not saponify.
Iodine number 69	Iodine number 58.

During the tests over open fire it was observed that a part of the contents of the vessel always remained unconverted and contaminated the thermoprene. Complete conversion was achieved when heating was carried out in an autoclave at 300-400° C. with a gas burner; the conversion products volatilizing at this temperature escaped through openings in the exhaust valve into the cooler (condenser) where they were cooled and caught in a receiver. Complete conversion took 15 to 20 minutes, and the vessel containing the rubber now held the thermoprene, a shiny, resin-like mass which hardened when cooled.

Attempts to lower the working temperature to 180-200° C. by applying appropriate pressure failed. When the process was carried out at 300-400° C. with pressure (so that the gaseous products did not volatilize), the thermoprene was outwardly the same as usual, but only hardened after prolonged exposure to the air when the volatile products had evaporated.

The conversion products of the volatile substances produced in the conversion of sodium butadiene rubber were dark brown fluids with sp. gr. 0.912-0.913. Fractional distillation of the condensates yielded fractions with boiling points ranging from 60 to 300° C. The low-boiling fraction was a pale yellow oily fluid of unsaturated character. As the temperature was raised, darker fractions were

obtained until at 300° C. nothing remained in the retort but a thick resinous mass. The acid number of the condensate was 2, iodine number 190, and flash point (Abel-Pensk) 9°.

When reacted with S_2Cl_2 the condensate formed a dark thick viscous fluid; the reaction was accompanied by violent separation of gases and considerable heating of the products.

Butadiene rubber from petroleum subjected to the same treatment as the sodium butadiene rubber gave very similar results, and in appearance the condensate and thermoprene were very like those obtained from sodium butadiene rubber. The author also tested gutta percha, but under the same conditions no residue was left; the gutta percha distilled completely over into the receiver. Fractional distillation yielded a mixture of oily products that were hard to separate and resembled those obtained from synthetic and natural rubbers, but in this case fractions boiling below 200° C. when distilled, yielded thick brown, non-hardening fluids.

The yield of thermoprene varies considerably, depending on the time and temperature of heating. Prolonged heating at high temperatures causes almost all the thermoprene to volatilize. Slow heating and gradual raising of the temperature increases the yield of thermoprene and gives a condensate richer in light-colored, low-boiling fractions. Rapid increase of temperature results in higher outputs of condensate and loss of volatile substances.

It is known that the conversion of natural rubber commences at 160° C. and that this can be decreased to 100-140° C. by adding appropriate ingredients to the rubber. In the case of sodium butadiene rubber, conversion does not begin until about 230-270° C. and it was attempted to lower the temperature by similar means as employed in the case of natural rubber. The ingredients used for the synthetic material included: sulphuric acid, chlorosulphonic acid, o-toluol-sulphonic acid, naphthalene-disulphonic acid, naphthol disulphonic acid, softeners (Rubrax, stearic acid, coal tar), sulphuric acid and phenol, natural rubber, reclaim, silica gel, aluminum chloride, etc. But in not a single instance could the beginnings of conversion be observed at temperatures below 230-270° C. Nor did prolonged milling help lower the conversion temperature. On the theory that the close chemical relations of rubber to thermoprene should facilitate the process of conversion, natural or synthetic rubber was mixed with thermoprene of sodium butadiene rubber, but when the temperature passed 100°, the thermoprene flowed out from the rubber—the structure of the latter remained unchanged.

Thermoprene of butadiene rubbers is much more brittle than that of natural rubber, and to increase viscosity and hardness of the former, various ingredients as oil, vaseline, pine tar, Rubrax, stearic acid, rubber cement, condensate from sodium butadiene rubber, etc., were incorporated in the thermoprene. The best results were obtained with Rubrax, condensate, and rubber cement; prolonged heating—for 48 hours—at 175-180° C. had a similar effect. But even in the improved thermoprene, brittleness was not greatly lessened.

The author points out that the above tests show the very interesting fact that butadiene rubbers, as compared with natural rubber, is an extremely inert material as concerns the effect of any kind of chemical on its thermal decomposition.

GREAT BRITAIN

Conservation of Natural Rubber Successful

How Britain was able to cut its consumption of natural rubber to about one half the prewar amount despite greatly increased production is revealed in a recently published survey by the Federation of British Rubber & Allied Manufacturers' Association. The technical staffs of the 289 members of the Federation's 24 panels representing Great Britain's entire rubber industry have been working for Rubber Control without any payment whatsoever, through a technical advisory committee under the chairmanship of S. A. Brazier, manager of Dunlop's technical department in Manchester. The committee, formed about six weeks before Japan entered the war, advises all sections of the industry except tires and cables, which have their own technical committees.

Probably the first measure taken by the technical advisory committee was to set up schedules indicating the maximum permissible amounts of rubber and reclaim to be used for the various types of products; to insure a guaranteed standard of quality the committee prepared war emergency specifications of minimum test requirements for the British Standards Institution. In this way all rubber manufacturers were put on the same footing so that important war users of rubber products in most cases also used the war emergency specifications. The result was not only a reduction—in spite of

greatly increased war production—of natural rubber consumption to a little less than one-third what it had been before the Federation acted, but also a simplification of manufacturers' production programs. Furthermore a manufacturer was enabled rapidly to take over production from another manufacturer either to increase output at short notice or because enemy action led to plant dislocation. A number of "utility" products were necessarily below peacetime super-quality grades, but they were adequate, and not one genuine complaint is said to have been received that the quality of any article was not sufficiently good in relation to the circumstances.

Minimum specifications were also worked out for cotton fabrics for hose, belting, etc., and as a result, four standard specifications were prepared for ducks for conveyer elevator, and transmission belting; a series of 11 specifications for fabrics for hose; while the specifications for fabrics used for rubber footwear, formerly considerably over 100, were cut to 11. The new standards appear to have the full approval of all users, and it is expected that with reasonable extensions of grades, they will be retained also when peace comes. In fact it is suggested that the present uniform standards of material may form a foundation for a guaranteed mark for export after the war.

The Federation's technical committee has also done valuable pioneer development work on the changeover of mechanical goods to synthetic rubber. Incidentally, the Federation stated that the American production of synthetic rubber is the colossal achievement of the war. The technical committee distributed about 50 tons of United States synthetic rubber to manufacturers who first tried out the new material for certain articles on a laboratory scale and then on a limited factory scale. The finished goods were sent to important consumers, chiefly government departments, to be used under conditions where their behavior as compared with similar articles of natural rubber could be observed. The resulting experience and the manufacturing processes adopted were collected and printed in a special series of "S" circulars by the Ministry of Supply and issued to all rubber manufacturers.

The behavior of synthetic rubber in action is being observed in bombers going to Berlin, on R.A.F. dinghies; in hose, depth charge tubing, and for watertight doors, for the Navy; in the Army's respirators, capes, coats for dispatch riders; in ebonite at radio location stations; as well as in hose for the National Fire Service, belting for coal mines, and even in football bladders.

The changeover has been advancing rapidly in different directions. Barrage balloons already largely use synthetic rubber; no natural rubber at all should be found in the newest respirators; as from January of this year, belting is supposed to contain 75% synthetic to 25% natural rubber; the cable industry now uses only one-quarter the amount of natural rubber it did before the war; dairy farmers are switching to synthetic rubber also, since unlike natural rubber, synthetic rubber remains unaffected by lactic acid. In short, thanks to the efforts of research workers the British rubber industry is now able to replace about three-quarters of its rubber needs by synthetic rubber.

Institution of the Rubber Industry

The program of the Institution of the Rubber Industry for January included the following meetings:

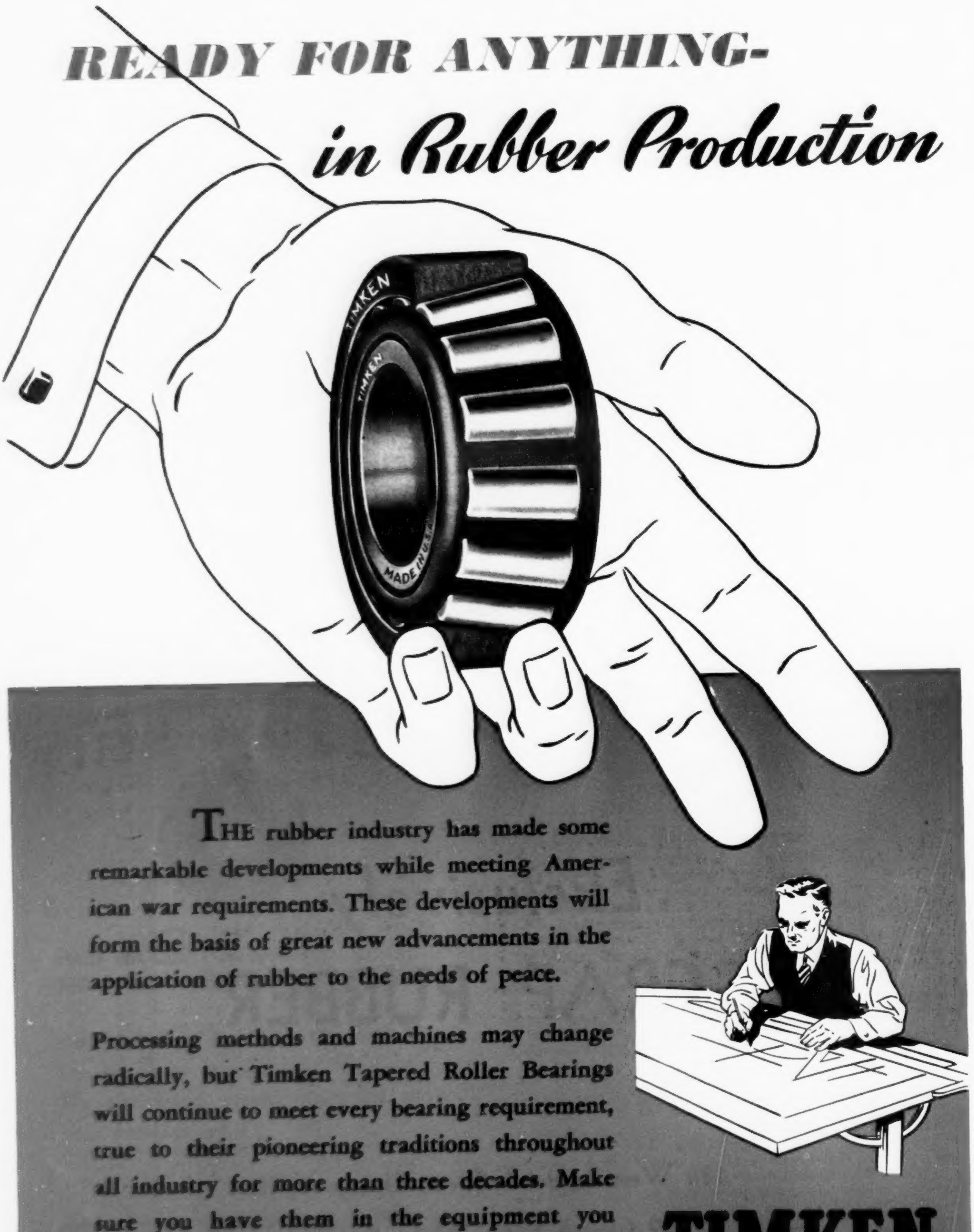
London Section: January 3. "Some Engineering Absurdities in the Rubber Industry", H. C. Young; "Some Recent Applications of Rubber to Mechanical Processes", G. B. Burnside (Ministry of Aircraft Production). George Martin, chairman, presided.

Manchester Section: January 10. "Manufacture and Production of Rubber Crumb", J. S. Tidmus; "Uses of Rubber Crumb as Applied to Tire Manufacture", H. E. Davis; "Rubber Crumb as Compounding Ingredients", J. R. Scott. W. N. Lister, chairman of this section, presided.

Leicester Section: January 15. "The Production and Properties of Viscose Rayon", Leslie Rose. Presiding was R. J. Metcalfe.

More Support for Research Urged

Great Britain's position as the leading exporting nation can only be recaptured by establishing a high degree of superiority and originality in industrial products, says a recent report from the Federation of British Industries. The greatest productive efficiency as well as the introduction and development of new materials and new products will be required, and to achieve this, industry and the government must take the necessary interest in research, and the proper degree of cooperation must be established between industry and scientific and technical personnel. More support is asked for existing collective research associations, and it is urged that those industries which have not yet created such associations should take the necessary steps to remedy the situation. It is also recommended that the government make an annual grant of at least £1,000,000 to the Department of Scientific and Industrial Research for the maintenance and expansion of its activities.


READY FOR ANYTHING-
in Rubber Production
TIMKEN
TIMKEN
MADE IN U.S.A.
THE rubber industry has made some remarkable developments while meeting American war requirements. These developments will form the basis of great new advancements in the application of rubber to the needs of peace.
Processing methods and machines may change radically, but Timken Tapered Roller Bearings will continue to meet every bearing requirement, true to their pioneering traditions throughout all industry for more than three decades. Make sure you have them in the equipment you manufacture or buy.
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TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Notes on the British Rubber Industry

G. E. Beharrell, formerly director of equipment sales at Fort Dunlop, and latterly resident director at Birmingham and vice chairman of the Dunlop Rim & Wheel Co., has been appointed joint managing director of the Dunlop Rubber Co., Ltd. At the same time H. L. Kenward, director of general sales for the tire division, was appointed a director of Dunlop Rubber, which he joined 32 years ago. Mr. Kenward, who is president of the Tire Manufacturers' Conference, is also chairman of the Reconstruction Committee of the British Rubber Federation, which is now examining the postwar situation.

During the past two years large quantities of polyvinyl chloride have been used in cable making, thus releasing some thousands of tons of rubber a year for other purposes. The increasing use of P.V.C. compounds by cable manufacturers has led to a heavy demand for certain compounding ingredients; so it has been found necessary to control their use. Accordingly the P.V.C. compounds for general and specialized cable manufacture have been standardized as from December 15, 1943.

The importation into England of Bardol, used in processing GR-S, is not permitted, but Binney & Smith & Ashby, Ltd., state that it is supplying a British equivalent which meets the American specifications and is known as Vulcoil "B." This material is claimed to be particularly useful to swell the polymer and increase particle size, thus facilitating carbon penetration and reenforcement.

Recently William Warne & Co., Ltd., India Rubber Mills, Barking, Essex, stated in reference to reports about United States progress in the manufacture of synthetic rubber thread that British rubber thread manufacturers have developed their own kind of thread made of 75% neoprene and 25% natural rubber. This thread, it seems, has been successfully tried out by most of the leading elastic manufacturers in the Midlands. It was further asserted that if any rubber thread at all is to be produced this year, more synthetic than natural rubber will be used for the purpose.

The Plastics Group of the Society of Chemical Industry met January 12 at the Institution of Mechanical Engineers, London, and with the Faraday Society presented a symposium of "Molecular Weight and Molecular Weight Distribution of High Polymers." Prof. E. K. Rideal was in the chair, and among those participating were: Professor W. H. Melville, who opened the symposium, G. Gee, E. A. W. Hoff, P. Jonson, H. Campbell, and Mr. Jellinek.

INDIA

Chir tar is a product said to be useful in rope and rubber manufacturing plants as well as for the manufacture of medicinals, says the annual issue of the "Indian Forest Report", and retorts for large-scale distillation of the material have been set up in the United Provinces.

Editor's Book Table

BOOK REVIEWS

"Rubber Red Book." 1943 Edition. Fourth issue. Published by *The Rubber Age*, 250 W. 57th St., New York 19, N. Y. Cloth. 6 x 9 inches. 580 pages. Price $5.

As indicated by the statements by the editor and by the publisher in the beginning of the book, this directory of the rubber industry, issued biennially, was prepared under somewhat more difficult and different conditions than editions of previous years. Despite these more exacting conditions this latest issue represents a commendable effort to review and bring up to date information of value to those both in and out of the industry. Containing about 70 more pages than did the 1941 edition, the 1943 edition follows about the same system of organization and classification. An article entitled, "Place of the Reclaiming Industry in the War Effort", by M. G. Shepard, development manager, Naugatuck Chemical Division, United States Rubber Co., presents a summary of happenings in the reclaiming industry during the past two years and the progress made to date on the problems of this section of the rubber industry. Rubber companies whose activities have been temporarily suspended until the supply and restriction situation becomes more satisfactory are footnoted to explain this fact.

The 1943 edition contains sections on the following: rubber manufacturers in the United States, classified alphabetically according to products, and geographically; rubber manufacturers in Canada; rubber machinery and equipment, listed by types and with manufacturers' names and addresses; accessories and fittings listed in a similar manner; rubber chemicals and compounding materials, listed as to type, and as to trade and brand names and including suppliers' addresses; fabric and textiles; crude rubber and related materials; synthetic rubber and other rubber-like materials; reclaimed rubber; scrap rubber dealers; rubber derivatives; rubber latex, including water dispersions and special latex processes, compounding materials and machinery and equipment; miscellaneous products and services, with new listings on fireproofing of fabrics, mildew treatment, processed separator cloth, etc.; consulting technologists; manufacturers' representatives, sales agents, branch offices, etc. in the United States and Canada; technical journals; trade and technical organizations; and "Who's Who in the Rubber Industry." A subject index is also included.

The book, which contains and correlates an extensive amount of data on the present-day rubber industry, should be of increased value during the war and the transition period.

"A.S.T.M. Standards on Plastics." Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. October, 1943. Paper, 9¼ by 6 inches. 431 pages. Price $2.

The 85 specifications, tests, and definitions in the latest compilation of standards on plastics indicate the extensive work done in this field by the American Society for Testing Materials.

In 1943 more than 25 new specifications and tests were standardized with particular emphasis on purchase specifications.

There are four standards on non-rigid plastics and 18 specifications covering numerous types of molding compounds and other plastics in the form of sheets, tubes, and rods. There are methods of tests covering distortion, hardness, tear resistance, thermal expansion, stiffness, tensile properties, compressive strength, dielectric constant, flammability, color-fastness to light, diffusion of light, and mar resistance.

Tests methods are included for the compression set of vulcanized rubber, low-temperature brittleness of rubber and rubber-like materials, compressive strength of electric insulating materials, hardness of rubber, durometer indentation, hardness of rubber, tear resistance of vulcanized rubber, and tension of rubber, which were prepared under the jurisdiction of Committee D-11 on Rubber Products and D-9 on Electrical Insulating Materials.

A tentative standard for descriptive nomenclature of objects made from plastics, and a standard of terms relating to the rheological properties of matter also are included.

"The Story of the Airship (Non-Rigid)." Hugh Allen. Published by the Goodyear Tire & Rubber Co., Akron, O. 1943. Cloth, 9¼ by 6 inches, 74 pages. Illustrated. Index. Price $1.

Sometimes called dirigibles, but more often "blimps", non-rigid airships are today a familiar sight above many coastal cities. They are useful in defense against mines and submarines in off-shore waters because they can be made to fly as slowly as desired. Indeed, they may be made to stand still in the air.

Investigation of lighter-than-air aeronautics was begun 100

years earlier than that of heavier-than-air. Benjamin Franklin watched the first flight of man in Paris in 1783.

"But of what use is a balloon?" he was asked by a practical-minded friend.

"Of what use," Franklin replied, "is a baby?"

Hugh Allen, associated with lighter-than-air operation since the first World War authoritatively describes the growth of the lighter-than-air baby which has taken its place as a man in the first World War and in the present global conflict. Interesting stories are told in this small volume of the adventures of the fleet of blimps maintained by the Goodyear company, which attained a remarkable safety record in 16 years. But of more importance are the results of fleet observations made in the course of four million miles of travel which have provided much useful knowledge about weather, flight, ground handling technique, design, and data for emergency bases. The vulnerability of non-rigid airships to enemy attack is discussed at some length, though no detailed summary of such activity is possible at this time.

NEW PUBLICATIONS

"GR-I Inner Tubes—Compounding and Processing." Stanco Distributors, Inc., 26 Broadway, New York 4, N. Y. 5 pages. The latest information on the compounding and processing of GR-I (Butyl rubber) inner tubes is contained in this memorandum. A suggested recipe is given, and instructions and precautions on mixing, cooling, extrusion, building, splicing, valves, and curing follow. Reference to previous WPB memoranda is made, and it is stated that although the suggestions in this latest memorandum are tentative, they are believed to be reasonably sound, and as time goes on, further information will be provided.

"Chemicals by Glyco." Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y. 116 pages. New products, processes, and materials developed by industrial research for metals, paper, textiles, adhesives, rubber, synthetic rubber, plastics, etc. are listed and described in this catalogue. Among the items suggested for use in the rubber industry are various synthetic wax compounds for finishing and polishing and a new ester for plasticizing synthetic rubber.

"Channel Blacks in Butyl Rubber." Report GR-I #1. Continental Carbon Co., 295 Madison Ave., New York, N. Y. 10 pages. In this report eight different grades of carbon black representing four types: CC, HPC, MPC, and EPC, are tested in GR-I in a test formula containing 50 parts of each black on 100 parts of the GR-I. An analysis of each black is given, and graphs are included to illustrate the variation of physical properties with approximate particle diameter of the blacks. In general rubber properties tend to show a definite trend when plotted against particle diameter. Contrary to previous results in natural rubber and other synthetics, in the GR-I formula used, Continental AA black appears to behave as if it were a coarser black than AAA. Likewise Continental R-40, a CC black, produces a GR-I compound which is more plastic and has a higher tubing rate than would be expected from its average particle diameter. It is suggested that this and other behavior of R-40 black may be due to poor dispersion.

"Steam Supply Systems and Curing Schedules for Recapping and Repairing Synthetic Tires and Tubes." United States Rubber Co., 1230 Sixth Avenue, New York, N. Y. 24 pages. Prefaced with the statement that synthetic materials require more exacting workmanship, curing schedules, and steam supply systems to provide satisfactory service, this booklet devotes considerable space to the discussion of steam supply systems, temperature and pressure indicators, and a pressure warning device for steam and air. A part of minimum horsepower requirements to operate section and recapping molds includes a table to aid in selecting a boiler of proper capacity. A section on using steam in section bags when curing repairs in synthetic tires recommends that steam bags be used in this work. The booklet concludes with recommended cures—recapping—repairing, in which details of curing times and temperatures for many different types of tires and tubes are given.

"Chemical and Physical Properties of Galex." Thiokol Corp., Trenton, N. J. Technical Service Bulletin No. 18. 4 pages. Galex, the main constituent of which is dihydroabietic acid and which is used in GR-S belting, hose, and other products, is reviewed as to its chemical and physical properties in this bulletin to aid the compounder already familiar with the material and for possible new users. The relative rate at which gum rosin, wood rosin, and Galex absorb oxygen is shown in graphical form, and the solubility, plasticity, and compatability characteristics of Galex are described.

"GR-S Field Wire Factory Trials." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. Booklet No. 1A. 12 pages. As a supplement to a previous pamphlet entitled "GR-S in Field Telephone Wire Insulation", this new booklet gives the details and conclusions of six factory trials made using compounds recommended in the first booklet and additional compounds which incorporated certain modifications found necessary as the trials were made. Formulae, processing details, and tests on the compound and finished insulation are given. A curing combination of 1% Altax, 1% Selenac, and 2% sulphur appeared quite satisfactory, and the final recommendations include the most satisfactory processing technique found as a result of these factory trials.

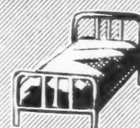
"Why Is Rubber Elastic?" L. R. G. Treloar. The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3., England. Publication No. 35. 10 pages. The kinetic theory of elasticity, as outlined, represents a considerable simplification, it is stated, but it presents an ideal picture, which may be more or less closely approximated to by real materials. There can be no doubt that the kinetic theory, though requiring modification and amendment in its application to real materials, does provide a better understanding of the phenomenon of rubber-like elasticity than any other theory yet advanced, because the assumptions on which it is based are in accordance with the known chemical properties of molecules. Its conclusions with regard to elasticity and the overriding importance of chain length follow inevitably from these basic assumptions, the paper states further.

"A New World". United States Testing Co., Inc., Hoboken, N. J. 24 pages. The activities of the various laboratories of the United States Testing Co. are outlined briefly in this booklet with the idea of answering questions that manufacturers may be asking as to what the testing laboratory can do for them in their present or future production efforts. It is stated that this company has established planning boards to help business plan its future production, distribution, and merchandising campaigns.

"Producing for War—Preparing for Peace." Firestone Tire & Rubber Co., Akron, Ohio. 34 pages. This interesting and generously illustrated booklet with a foreword by John W. Thomas, explains Firestone's part in the war effort and indicates in a general way some of this company's plans for postwar activity. Reference is made to the Firestone plantations in Liberia, and considerable space is devoted to the manufacture of Butaprene, the Firestone synthetic rubber. The many products made for the Armed Services are illustrated, and the 48 Firestone factories are shown and their products indicated. Under the heading "Preparing for Peace" it is stated that plastics, synthetic rubber, and metal alloys will assume new importance in the postwar world, and in each field Firestone is experienced. A potential passenger-tire replacement demand in the first postwar year of 55.5 million tires is estimated in a section on "The Future Picture for Tires." It is also stated that Firestone retail outlets not only have been able to maintain, but also to surpass their sales volume and profits of prewar years during 1942 and 1943 by selling non-rationed items.

"Price List of American Standards." American Standards Association, 29 West 39th St., New York 18, N. Y. 24 pages. There are more than 600 standards listed in this booklet, of which 64 have been approved or revised since the last price list was printed in April, 1943. Included are standards developed through an accelerated procedure and designated as American War Standards. The complete list should serve as a valuable reference material for engineers, manufacturers, purchasing agents, etc.

"Interaction between Rubber and Liquids. IV. Factors Governing the Absorption of Oil by Rubber." G. Gee. Publication No. 36. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3, England. 16 pages. The purpose of this paper is to disprove the belief that the swelling and dispersion of rubber in solvents is due to the rubber attracting and holding the liquid with some strong force. Considering rubber from the standpoint of solubility as a liquid, and regarding the absorption of oil by rubber as the mixing of two liquids, the author investigates the problem of whether these liquids mix because of the increase of entropy, or whether there is really some force of attraction between the rubber and the oil. Data and conclusions are presented to show that the absorption of oil by rubber is the same phenomenon as underlies the mixing of simple gases and liquids: namely, an increase in entropy brought about by the natural tendency of the molecules to mix by thermal motion. Both natural and synthetic rubbers are used in the work, and it is stated in the conclusions that rubber cannot be made oil resisting by physical compounding and that the chemical structures likely to give oil resisting rubbers can be predicted from the results obtained.



"Emeryfacts." Emery Industries, Inc., 4300 Carew Tower, Cincinnati, O. 28 pages. This loose-leaf bulletin brings together, in a handy working arrangement, data on the derivation and chemical nature of fatty acids, their compounds, and several tables illustrating many of their commercial applications. In addition this bulletin tabulates the specifications and characteristics of the company's fatty acid products. A graph gives the pounds of several reacting materials per 100 pounds of fatty acid for a range of acid and saponification values from 185 to 215. Of special interest is information on aliphatic dibasic and low molecular weight fatty acids. These materials are indicated as useful in the preparation of esters with high boiling points, which in turn might be useful as plasticizers. The dibasic acid, azelaic, has the special property of forming soft alkyd resins. A glossary of terms peculiar to the fatty acid industry completes the bulletin.

"Inspected Electrical Equipment. Supplement to May, 1943 List." November, 1943. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. 56 pages. **"Fun En Route** for Our Armed Forces." Firestone Tire & Rubber Co., Akron, O. 34 pages. **"Some A B C's of Postwar Planning."** Metropolitan Life Insurance Co., New York, N. Y. 6 pages. "Cotton Production and Distribution, Season of 1942-43." Bulletin 180. United States Department of Commerce, Bureau of the Census, Washington, D. C. 56 pages. **"Proceedings of the 1943 Convention."** Industrial Accident Prevention Associations, 600 Bay St., Toronto, Ont., Canada. 144 pages. **"Who—What—Why?"** Foster D. Snell, Inc., 305 Washington St., Brooklyn 1, N. Y. 8 pages.

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Market Reviews

COTTON & FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	Jan. 1	Jan. 29	Feb. 5	Feb. 12	Feb. 19	Feb. 26
Mar.	19.79	20.30	20.49	20.84	20.99	20.76
May	19.49	20.05	20.15	20.36	20.60	20.64
July	19.17	19.70	19.73	19.95	20.10	20.11
Oct.	18.83	19.16	19.14	19.33	19.41	19.42
Dec.	18.71	18.99	18.96	19.17	19.22	19.23

New York Quotations

February 28, 1944

Drills

38-inch 2.00-yard	yd.	....
40-inch 1.45 yard		....
50-inch 1.52-yard		\$0.29
52-inch 1.85-yard		.23⅞
52-inch 1.90-yard		.23223/.2325
52-inch 2.20-yard		.20511
52-inch 2.50-yard		.185
59-inch 1.85-yard		.23851

Ducks

38-inch 2.00-yard D. F.	yd.	.215/.22⅝
40-inch 1.45-yard S. F.		.2975
51½-inch 1.35-yard D. F.		.335
72-inch 1.05-yard D. F.		.43/.45
72-inch 17-21 ounce		.48⅞
Mechanicals		
Hose and belting	lb.	.4275
Tennis		
51½-inch 1.35-yard	yd.	.315
51½-inch 1.60-yard	yd.	.27⅛
51½-inch 1.90-yard	yd.	.23⅛

Hollands — White

Blue Seal		
20-inch	yd.	.135
30-inch		.2425
40-inch		.27
Gold Seal		
20-inch	yd.	.145
30-inch		.2575
40-inch		.29
Red Seal		
20-inch	yd.	.1225
30-inch		.22
40-inch		.245

Osnaburgs

40-inch 2.34-yard	yd.	.155⅝
40-inch 2.48-yard		.14⅝
40-inch 2.56-yard S. F.		.14578
40-inch 3.00-yard		.1275
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21⅜
37-inch 2.42-yard clean		.1525

Raincoat Fabrics

Cotton		
Bombazine 64 x 60	yd.	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38½-inch, 64 x 60		.08971
Sheeting, 40-inch		
48 x 48, 2.50-yard	yd.	.16200
64 x 68, 3.15-yard		.13968
56 x 60, 3.60-yard		.11944
44 x 40, 4.25-yard		.09764
Sheetings, 36-inch		
48 x 44, 5.00-yard	yd.	.08600
40 x 40, 6.15-yard		.06991

Tire Fabric

Builder		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.48
Chafer		
14 ounce 60" 20/8 ply Karded peeler	lb.	.48
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.45
Cord Fabrics		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.44
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.42
12/4/2 Karded peeler, 1 1/16" cotton	lb.	.42
23/5/3 Karded peeler, 1¼" cotton	lb.	.44
Leno Breaker		
8¾ ounce and 10¼ ounce 60" Karded peeler	lb.	.45

There was a firm improvement in the February cotton market as aggressive resumption of trade and mill buying and active price fixing boosted futures prices. Events were decided by the continued anticipation as to government action regarding the lend-lease purchases on the open market. The usual flurries of profit-taking liquidation and scattered hedge-selling sometimes modified the advance, but prices rose rapidly since the first week in February, when they were the highest since July, until the latter part of the month, when futures carried the March month to the highest level for prices in 15 years. On February 19 the position traded at 20.80¢ and on February 21 at 20.87¢.

The price of 15/16-inch spot middling cotton, which closed at 21.13¢ on February 1, fluctuated, but rose rapidly from (the low) 21.12¢ of February 5 to (the high) 21.64¢ of February 16, and closed at 21.28¢ on March 1.

It was reported February 7 that the government's currently projected goal for production of all tire cords for 1944, including cotton, high-tenacity viscose rayon, nylon, and acetate, is 400,000,000 pounds. Export needs are additional. It was not known then how this figure would break down between the different fibers. This program is short of 400,000 bales against a prewar figure of about 700,000 bales.

The Census Bureau on February 15 released the information that cotton consumed during January totaled 819,489 bales of lint and 99,117 bales of linters, compared with 916,785 of lint and 110,772 of linters during January last year. The Cotton Exchange Service Bureau listed total distribution in the United States from August 1 to January 31 at 5,791,000 bales.

The rumor was carried that Spain would be in the market for between 40,000 and 50,000 bales of raw cotton, subject to the approval of the State Department.

Fabrics

Business has been dull and practically at a standstill in all coarse goods, although the Army has made known its wide need of ducks, and civilian demand is so much heavier than the supply which is down to the vanishing point. There was an improvement over January's condition in the scattered sales in sheetings and osnaburgs, print cloths, and drills, but the situation is unchanged regarding current demand for sheetings from the rubber manufacturers.

It was reported that the government would request 7,600,000 yards of osnaburg for the Army. This, supplemented by increased local and commission-house demand, produced February 19, further strength in cotton futures.

New Incorporations

Mechanical Rubber Products Corp., New York, N. Y. Capital, 100 shares, no par value. Irving Ratner, 2630 Park Ave., New York 51, N. Y. Rubber products of all kinds.

Royal Rubber Products Co., 2017 S. Michigan Ave., Chicago, Ill. Capital, 10 shares common, par value \$100. F. M. and P. D. Greene, and B. M. King, all of Chicago. To sell at wholesale tire repair materials and automotive accessories.

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Balata		
Manaos Block	\$0.38¾	\$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6

Tires‡	\$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00
Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50
Miscellaneous Items‡‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
‡‡ All consuming centers.

Reclaimed Rubber Prices

Auto Tire	Sp. Grav.	¢ per Lb.
Black Select	1.16–1.18	6½/ 6¾
Acid	1.18–1.22	7½/ 7¾
Shoe		
Standard	1.56–1.60	7 / 7¼
Tubes		
Black	1.14–1.26	11¼/11½
Gray	1.15–1.26	12½/13¼
Red	1.15–1.32	12 /12¼
Miscellaneous		
Mechanical blends	1.25–1.50	4½/ 5½
White	1.35–1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	$0.04
Rottenstone, domestic	lb.	.025	.03

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy	lb.		
technical, light	lb.	.0625	.07

Accelerators, Organic

A-1	lb.	.28	.33
A-10	lb.	.36	.42
A-19	lb.	.52	.65
A-32	lb.	.60	.70
A-46	lb.	.50	.57
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Accelerator No. 8	lb.	.63	.65
49	lb.	.41	.42
808	lb.	.59	.61
833	lb.	1.13	1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Aldehyde ammonia	lb.	.65	.70
Altax	lb.	.43	.45
Arazate	lb.	1.53	
B-J-F	lb.	.38	.43
Beutene	lb.	.59	.64
Butasan	lb.	1.13	
Butazate	lb.	1.13	
Butyl Eight	lb.	.97	.99
C-P-B	lb.	1.95	
Captax	lb.	.38	.40
D-B-A	lb.	1.95	
Delac A	lb.	.39	.48
O	lb.	.39	.48
P	lb.	.39	.48
Di-Esterex-N	lb.	.50	.57
DOTG (Diorthotolylguanidine)	lb.	.44	.46
DPG (Diphenylguanidine)	lb.	.35	.45
El-Sixty	lb.	.40	.47
Erie Accelerator	lb.	.60	.62
Ethasan	lb.	1.13	
Ethazate	lb.	1.13	
Ethylidene Aniline	lb.	.42	.43
Formaldehyde P.A.C.	lb.	.06	.0625
Formaniline	lb.	.36	.37
Guantal	lb.	.39	.48
Hepteen	lb.	.34	.39
Base	lb.	1.25	1.40
Hexamethylenetetramine			
U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.135	
Witco	lb.	.15	
Ledate	lb.	1.48	
MBT	lb.	.38	.43
MBTS	lb.	.43	.48
Methasan	lb.	1.23	
Methazate	lb.	1.23	
Monex	lb.	1.53	
Morfex "33"	lb.	.67	.72
"55"	lb.	.96	1.01
O-X-A-F	lb.	.38	.43
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.74	.84
Flour	lb.	.1225	.1325
O	lb.		
Flour	lb.		
Phenex	lb.	.49	.54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
R & H 50-D	lb.	.42	.43
Rotax	lb.	.48	.50
Safex	lb.	1.15	1.25
Santocure	lb.	.60	.67
Selenac	lb.	1.98	
SPDX-G	lb.		
SRA No. 1	lb.	.38	.50
Super Sulphur No. 2	lb.	.13	.15
Tetrone	lb.	1.53	
Thiocarbanilide	lb.	.28	.33
Thiofide	lb.	.43	.50
Thionex	lb.	1.53	
Thiotax	lb.	.38	.45
Thiurad	lb.	1.53	
Thiuram E	lb.	1.53	
M	lb.	1.53	
Trimene	lb.	.54	.64
Base	lb.	1.03	1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.53	
Tuex	lb.	1.53	
2-MT	lb.	.58	.60
Ulto	lb.	.99	.04
Ureka	lb.	.50	.57
Blend B	lb.	.50	.57
C	lb.	.48	.55
Vulcanex	lb.	.42	.43
Z-B-X	lb.	2.45	
Zenite	lb.	.40	.42
A	lb.	.45	.47
B	lb.	.42	.44
Special	lb.	.47	
Zimate, Butyl	lb.	1.13	
Ethyl	lb.	1.13	
Methyl	lb.	1.23	
Zipacel	lb.	1.65	

Activators

Aero Ac 50	lb.	$0.46	$0.52
Barak	lb.	.50	
MODX	lb.	.295	.345
SL-20	lb.	.1089	.1135

Age Resisters

AgeRite Alba	lb.	1.95	2.05
Gel	lb.	.52	.54
Hipar	lb.	.61	.63
Powder	lb.	.43	.45
Resin	lb.	.43	.45
D	lb.	.43	.45
White	lb.	1.23	1.33
Akroflex C	lb.	.53	.55
Albasan	lb.	.69	.74
Aminox	lb.	.43	.52
Antox	lb.	.54	.56
Betanox	lb.	.43	.52
B-L-E	lb.	.43	.52
Powder	lb.	.61	.70
B-X-A	lb.	.43	.52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.43	.55
White	lb.	.89	1.00
M-U-F	lb.	1.48	
Neozone (standard)	lb.	.61	.63
A	lb.	.43	.45
C	lb.	.43	.45
D	lb.	.43	.45
Distilled	lb.	.48	.50
E	lb.	.61	.63
Oxynone	lb.	.77	.90
Permalux	lb.	1.18	1.20
Santoflex B	lb.	.43	.45
BX	lb.	.54	.64
Santovar-O	lb.	1.15	1.40
Solux	lb.	1.28	1.30
Stabilite	lb.	.48	.69
Alba	lb.	.50	.74
Thermoflex A	lb.	.61	.63
C	lb.	.54	.56
Tysonite	lb.	.165	.17
V-G-B	lb.	.43	.52

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.70	3.55
Liquid, 50%	100 *lbs.*	1.95	
Solid (100-*lb. drums*)	100 *lbs.*	2.30	3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.34	.39
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445	.475
U-T-B	lb.	.34	.39

Antiseptics

Compound G-4	lb.	1.25	
G-11	lb.	5.65	

Antisun Materials

Heliozone	lb.	.23	.24
S.C.R.	lb.	.32	.34
Sunproof	lb.	.2275	.2775

Blowing Agents

Ammonium carbonate, lumps (500-*lb. drums*)	lb.	.0825	
Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175	.0185

Colors

Black			
Lampblack (commercial), *l.c.l.*	lb.	.15	
Blue			
Du Pont Powders	lb.	2.25	3.75
Heliogen BKA	lb.		
Toners	lb.		
Brown			
Mapico	lb.	.1135	
Green			
Chrome	lb.	.25	
Oxide (*freight allowed*)	lb.	.24	
Du Pont Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		
Orange			
Du Pont Powders	lb.	2.75	3.05
Toners	lb.		
Orchid			
Toners	lb.	**	
Pink			
Toners	lb.	**	
Purple			
Toners	lb.	**	
Red			
Antimony			
Crimson, 15/17%	lb.		
R.M.P. No. 3	lb.	$0.48	
Sulphur free	lb.	.52	
Golden 15/17%	lb.		
7-A	lb.	.37	
Z-2	lb.	.25	
Cadmium, light (400-*lb. bbls.*)	lb.	.85	
Du Pont Powders	lb.	.48	$1.65
Iron Oxide, *l.c.l.*	lb.	.07	.15
Mapico	lb.	.0885	.096
Rub-Er-Red (*bbls.*)	lb.	.0975	
Toners	lb.		
White			
Lithopone (*bags*)	lb.	.0425	.045
Albalith	lb.	.0425	.045
Astrolith (50-*lb. bags*)	lb.	.0425	
Azolith	lb.	.0425	.045
Titanium Pigments			
Ray-Bar	lb.	.0575	.0625
Ray-Cal	lb.	.055	.06
Rayox	lb.	.145	.155
Titanolith (50-*lb. bags*)	lb.	.056	.0575
Titanox-A LO and MO	lb.	.145	.15
C	lb.	.055	.0575
Ti-Tone	lb.		
Zopaque (50-*lb. bags*)	lb.	.145	.1525
Zinc Oxide			
Azo ZZZ-11	lb.	.0725	.075
44	lb.	.0725	.075
55	lb.	.0725	.075
66	lb.	.095	.0975
French Process, Florence			
Green Seal-8	lb.	.09	.0925
Red Seal-9	lb.	.085	.0875
White Seal-7	lb.	.095	.0975
Kadox, Black Label-15	lb.	.0725	.075
No. 25	lb.	.085	.0875
72	lb.	.0725	.075
Red Label-17	lb.	.0725	.075
Horse Head Special 3	lb.	.0725	.075
XX Red-4	lb.	.0725	.075
23	lb.	.0725	.075
72	lb.	.0725	.075
78	lb.	.0725	.075
80	lb.	.0725	.075
103	lb.	.0725	.075
110	lb.	.0725	.075
St. Joe (lead free)			
Black Label	lb.	.0725	.075
Green Label	lb.	.0725	.075
Red Label	lb.	.0725	.075
U.S.P.	lb.	.105	.1075
Zinc Sulphide Pigments			
Cryptone-BA-19	lb.	.056	.0585
BT	lb.	.056	.0585
CB	lb.	.056	.0585
MS	lb.	.0575	.06
ZS No. 20	lb.	.0825	.085
86	lb.	.0825	.085
230	lb.	.0825	.085
800	lb.	.0825	.085
Sunolith	lb.	.0425	
Yellow			
Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	.60	
Du Pont Powders	lb.	.70	1.75
Mapico	lb.	.0685	.071
Toners	lb.		

Dispersing Agents

Bardex	lb.	.0425	.045
Bardol	lb.	.025	.0275
B	lb.	.05	.0525
Nevoll (*drums, c.l.*)	lb.	.02	.025

Extenders

Advagum 1098	lb.	.42	
1198	lb.	.40	
Extendex C	lb.		
Naftolen R-100	lb.	.10	.12
Oroplast	lb.	.11	.155
"600"	lb.	.14	.16
Vanzak	gal.	.05	.06

Fillers, Inert

Asbestine, *c.l.*	ton	20.00	
Asbestos Fiber	ton	15.50	48.00
Barytes	ton	40.00	
f.o.b., St. Louis (50-*lb. paper bags*)	ton	25.55	
Off color, domestic	ton	29.00	
White, domestic	ton	38.50	40.00
Blanc fixe, dry, precip.	ton	80.00	
Calcene	ton	37.50	43.00
Infusorial earth	lb.	.0225	
Kalite No. 1	ton	26.00	
3	ton	36.00	
Kalvan	ton	100.00	
Magnesium Carbonate *l.c.l.*	lb.	.0725	.1075
Paradene No. 2 (*drums*)	lb.	.0525	
Pyrax A	ton	7.50	
Whiting			
Suprex White	ton	32.50	
Witco, *c.l.*	ton	8.00	
Witcarb	ton	100.00	
R-12	ton	50.00	

Finishes

Mica, *l.c.l.*	ton	20.00	85.00
Rubber lacquer, clear	gal.	1.00	2.00
Colored	gal.	2.00	3.50
Shoe varnish	gal.	1.45	
Talc	ton	25.00	35.00

Flock

Cotton flock, dark	lb.	.095	.112
Dyed	lb.	.45	.85
White	lb.	.12	.20

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.

**Because of difficulty in interpreting OPA ceilings, consumers should contact supply houses for prices.

Rayon flock, colored	lb.	$1.00 / $1.50
White	lb.	.75 / 1.25

Latex Compounding Ingredients

Accelerator 89	lb.	1.20
552	lb.	1.63
Aerosol OT Aqueous 25% (*drums*)	lb.	.35
Antox, dispersed	lb.	.54
Aquarex F	lb.	.85
Areskap No. 50	lb.	.18 / .24
100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
400 dry	lb.	.51 / .65
Black No. 25, dispersed	lb.	22 / .40
Casein	lb.	.24 / 24.75
Color Pastes, dispersed	lb.	.75 / 1.10
Copper Inhibitor X-872	lb.	2.25
Darvan No. 1	lb.	.30 / .34
2	lb.	.30 / .34
3	lb.	.30 / .34
Dispersex No. 15	lb.	.11 / .12
20	lb.	.08 / .10
Factex Dispersion A	lb.	.185
Heliozone, dispersed	lb.	.25
MICRONEX, Colloidal	lb.	.06 / .07
Neoprene Latex Extender Emulsion 17	lb.	.12 / .14
R-2 Crystals	lb.	1.55
S-1 (400-*lb. drums*)	lb.	.65
Santobrite Briquettes	lb.	
Powder	lb.	
Santomerse D	lb.	.41 / .65
S	lb.	.11 / .25
Sodium Stearate	lb.	.40
Stablex A	lb.	.90 / 1.10
B	lb.	.70 / .95
C	lb.	.40 / .50
Sulphur, dispersed	lb.	.10 / .15
No. 2	lb.	.08 / .12
T-1 (440-*lb. drums*)	lb.	.40
Tepidone	lb.	.63
Tetrone A	lb.	2.20
Tysonite, dispersed	lb.	.32 / .35
Zinc oxide, dispersed	lb.	.12 / .15

Mineral Rubber

Black Diamond, *l.c.l.*	ton	25.00 / 30.00
B.R.C. No. 20	lb.	.0105 / 01.15
Hydrocarbon, Hard	ton	25.00 / 27.00
MilliMar	lb.	.055
Parmr	ton	25.00 / 30.00
Pioneer, *c.l.*	lb.	25.00 / 30.00
285°-300°	ton	25.00 / 27.00

Mold Lubricants

Aluminum Stearate	lb.	.23 / .24
Aquarex D	lb.	.60
MDL Paste	lb.	.25
Colite	gal.	.90 / 1.15
Dipez Mold Wash	lb.	
Lubrex	lb.	.25 / .30
Rubber-Glo, conc. regular	gal.	.94 / 1.15
Type W	gal.	.99 / 1.20
Sericite	ton	65.00
Soapstone, *l.c.l.*	ton	25.00 35.00
Zinc Stearate	lb.	.30 / .31

Oil Resistant

A-X-F	lb.	.82 / .85

Reclaiming Oils

B.R.V.	lb.	.035 / .0375
C-10	gal.	.19 / .24
D-4	gal.	.17 / .22
E-5	gal.	.15 / .20
No. 1621	lb.	.021 / .0235
S.R.O.	lb.	.02 / .0225
X-60 (reclaiming)	gal.	.20 / .27
X-443	gal.	.29

Reenforcers

Alumina, Hydrated		
Alorco C-740	lb.	.0375 / .065
C-741	lb.	.0375 / .065
Buca	ton	40.00
Carbon Black		
Aerfloted Arrow Specification (*bags only*)	lb.	.0355†
Arrow Compact Granulized	lb.	.0355†
Certified Heavy Compressed (*bags only*)	lb.	.0355†
SPHERON	lb.	.0355† / .07
Channel "S"	lb.	.12*
Continental, dustless	lb.	.0355†
"AA"	lb.	
Compressed (*bags only*)	lb.	.0355†
Disperson	lb.	.0355†
Dixie	lb.	.0355†
20	lb.	.035†
Dixiedensed	lb.	.0355†
66	lb.	.0355†
77	lb.	.0355†
Furnex Dense	lb.	.035 / .06
Beads	lb.	.035 / .06
Gastex	lb.	.035 / .06
HX	lb.	.0355†
Kosmobile	lb.	.0355†
66	lb.	.0355†
77	lb.	$0.0355†
S	lb.	.0355†
Kosmos	lb.	.0355†
20	lb.	.035†
MICRONEX Beads	lb.	.0355† / $.75
Hi-Tear	lb.	.0355 / .75
Mark II	lb.	.0355 / .75
Standard	lb.	.0355 / .75
W-6	lb.	.0355 / .75
P-33	lb.	.0475
Pelletex	lb.	.035 / .06
SPHERON C (*bags*)	lb.	$0.0455†
I (*bags*)	lb.	.0405
N (*bags*)	lb.	.15
T (*bags*)	lb.	.09
Statex A	lb.	.08 / .10
B	lb.	.07 / .09
STERLING	lb.	.035
Thermax	lb.	.0225
"S"	lb.	.0675
TX	lb.	.0355†
Velvetex	lb.	
"WYEX BLACK"	lb.	.0355†
Carbonex Flakes	lb.	.03 / .035
S	lb.	.031 / .036
Plastic	lb.	.031 / .0335
Clays		
Aerfloted Hi-White	ton	10.00
LGB	ton	15.00
Paragon (50-*lb. bags*)	ton	10.00
Suprex (50-*lb. bags*)	ton	10.00 / 23.50
Catalpo, *c.l.*	ton	30.00
China	ton	25.00
Dixie	ton	10.00 / 22.50
"L"	ton	10.00
Langford	ton	8.50
McNamee	ton	10.00
#33	ton	30.00
Par	ton	10.00
Paraforce, *c.l.*	ton	50.00
Witco, *c.l.*	ton	10.00
Cumar EX	lb.	.05
MH	lb.	.065 / .115
V	lb.	.095 / .125
465 Resin	lb.	
"G" Resin	lb.	
Nevindene	lb.	
Silene "EF"	lb.	.055 / .06

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Para-Dors (ABCD)	lb.	1.00 / 3.40
Rodo No. 0	lb.	4.00 / 4.50
10	lb.	5.00 / 5.50

Rubber Substitutes

Black	lb.	.095 / .17
Brown	lb.	.095 / .18
White	lb.	.10 / .20
Factice		
Amberex Type B	lb.	.20
Brown	lb.	.095 / .19
Neophax A	lb.	.165
B	lb.	.165
White	lb.	.10 / .20
Polyester, Millable 56-40A	lb.	.36 / .38
Vulprene 72-28AR	lb.	.38 / .45
Dispersion B7-41	lb.	.25 / .26
Emulsion D4-31A	lb.	.29 / .30

Softeners and Plasticizers

Abalyn	lb.	.0722 / .0947
Ambidex Regular	lb.	.225 / .23
"S"	lb.	.225 / .23
B.R.T. No. 7	lb.	.02 / .021
Belro Resin	100 lb.	2.71 / 3.00
Bondogen	lb.	.98 / 1.05
Buna Modifier 56-40	lb.	.30 / .31
Bunnatol (for synthetic rubber)	lb.	
G	lb.	.40 / .50
S	lb.	.40 / .50
Burgundy pitch	lb.	
Circosol-2XH Elasticator for GR-S	gal.	
Copene Resin	lb.	.32
Dibenzyl Sebacate	lb.	.67 / .74
Dibutyl Sebacate	lb.	.48 / .55
Dicapryl Phthalate	lb.	.25 / .30
Dipentene	gal.	.56 / .58
Dipolymer Oil	gal.	.33 / .38
Dispersing Oil No. 10	lb.	.0375 / .04
Duraplex C-50 LV, 100%	lb.	.25 / .295
Falkomer 106	lb.	.30
108	lb.	.30
Galex	lb.	.065 / .20
Hercolyn	lb.	.1122 / .1347
Hercules Resin 733	lb.	.06 / .065
LM-Nypene (*drums*)	lb.	.25
LX-436 (*tank car*)	lb.	.027
Myristilene	lb.	.20 / .30
Nevinol	lb.	.13 / .14
No. 16 Resin	lb.	.60
Nuba resinous pitch (*drums*)		
Grades No. 1 and No. 2	lb.	.29
3-X	lb.	.0425
Nypene Resin	lb.	.32
Palm oil (Witco), *c.l.*	lb.	
Palmalene	lb.	.15
Palmol	lb.	.16 25
Para Flux (reg.)	gal.	.17 / .18
No. 2016	gal.	.135 / .19
Para Lube	lb.	.046 / .048
Paradene No. 1 (*drums*)	lb.	.0525
Special (*drums*)		
20 to 35° C. M.P.	lb.	.0625
35 to 45° C. M.P.	lb.	.0625
45 to 75° C. M.P.	lb.	.0575
Paroils	lb.	.0975 / .18
Piccocizer "30"	lb.	
Piccolyte Resins	lb.	.15 / .185
Piccoumaron Resins	lb.	.045 / .15
Pictar	gal.	.18 / .23
Pine tar	gal.	
Oil	gal.	$0.45
Plasticizer B	lb.	$0.35 / $0.45
55	lb.	.20 / .235
Plastoflex No. 10	lb.	.20
No. 20	lb.	.25
Plastogen	lb.	.0775 / .08
Plastone	lb.	.27 / .30
Poly-pale Resin	lb.	.06 / .07
R-19 Resin (*drums*)	lb.	.1075
21 Resin (*drums*)	lb.	.1075
Reogen	lb.	.115 / .12
Resin R6-3	lb.	.38 / .40
RPA No. 1E	lb.	.55
2	lb.	.65
3	lb.	.46
4	lb.	.80
Solvenol	gal.	.56 / .58
Staybelite	lb.	.06 / .065
Tarzac	lb.	.23 / .24
TP-10	gal.	.55 / .75
90	gal.	.55 / .65
Turgum	lb.	.07 / .0735
"S"	lb.	.0625 / .0675
Vinsol Resin	lb.	.025 / .035
Vistac No. 1	lb.	.20 / .214
No. 2	lb.	.214 / .227
Witco No. 20, *l.c.l.*	gal.	.20
X-1 resinous oil (*tank car*)	lb.	.011 / .016
XX-100 Resin	lb.	.0525

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015 / .016
60°C. M.P.	lb.	.015 / .016
75°C. M.P.	lb.	.015 / .016

Solvents

Beta-Trichlorethane	lb.	.20
Carbon Bisulphide	100 lbs.	5.75
Tetrachloride	gal.	.80
Cosol No. 1	gal.	.26
No. 2	gal.	.25
No. 3	gal.	.22
Industrial 90% benzol (*tank car*)	gal.	.15 / .22
Nevsol	gal.	.245 / .31
Picco	gal.	.22 / .32
Skellysolve	gal.	

Stabilizers for Cure

Barium Stearate	lb.	.29 / .32
Calcium Stearate	lb.	.26 / .27
Laurex (*bags*)	lb.	.1475 / .1725
Lead Stearate	lb.	
Magnesium Stearate	lb.	.31 / .32
Stearex, Single Pressed	lb.	.15⅜ / .16⅜
Double Pressed	lb.	.15⅞ / .16⅞
Beads	lb.	.14⅞ / .15⅞
Stearic acid, single pressed	lb.	
Stearite, *c.l.*	lb.	.1487
Zinc Laurate	lb.	.29 / .32
Stearate	lb.	.30 / .31

Synthetic Rubber

Hycar OR-15	lb.	.56 / .72
OR-25	lb.	.50 / .66
OS-10	lb.	.50 / .66
Neoprene Latex Type 571 dry weight	lb.	.50
60	lb.	.60
Neoprene Type CG	lb.	.70
E	lb.	.65
FR	lb.	.75
GN	lb.	.28 / .30
ILS	lb.	
KNR	lb.	.75
Perbunan 26	lb.	.53
Synthetic 100	lb.	.41
"Thiokol" Type "A"	lb.	.35 1.40
"FA"	lb.	.50 1.60
Molding powder No. 472	lb.	.61
1001	lb.	.75
Water Dispersions ("Thiokol" Latex) dry weight		
MF	lb.	.70 / .80
MX-3112	lb.	.65 / .75
WD-2	lb.	.75 / .85

Tackifiers

B.R.H. No. 2	lb.	.02 / .021
Buna Tackifier 56-36	lb.	.28 / .30
LX-433 (*tank car*)	lb.	.068
P.H.O. (*drums*)	lb.	.24
Plastac	lb.	.12
TY-PLY	gal.	6.75 / 8.00
QS	gal.	6.75 / 8.00
(SC)	gal.	6.75 / 8.00

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25
Sulphur	100 lbs.	2.05
Chloride (*drums*)	lb.	.04
Telloy	lb.	1.75
Thiogen 6	lb.	.18 / .25
10	lb.	.18 / .25
Tonox	lb.	.50 / .59
Vandex	lb.	1.75
(See also Colors—Antimony)		

Waxes

1515-A (black)	gal.	1.35
C (clear)	gal.	1.25
Carnauba, No. 3 chalky	lb.	.7125
2 N.C.	lb.	.7575
3 N.C.	lb.	
1 Yellow	lb.	.8325
2	lb.	.8125
Carnube	lb.	.49 / .59
Montan	lb.	.12 / .17
Rubber Wax No. 118, Neutral	gal.	.76 / 1.31
Colors	gal.	.86 / 1.41

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ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Replies forwarded without charge*

SITUATIONS OPEN

ENGINEERS
CHEMICAL, MECHANICAL OR DEVELOPMENT

Major industrial company is setting up staff to handle postwar operations. Interested in several experienced men, college trained, for our Development, Engineering, and Manufacturing Divisions. Our interest is in men capable of supervising and carrying forward important technical work of a very broad nature. In reply cover carefully experience, education, draft status, and salary expected.

ADDRESS BOX NO. 793
Care of INDIA RUBBER WORLD

WANTED CHEMIST—MUST HAVE A GOOD KNOWLEDGE of and experience in rubber compounding as well as the manufacturing and utilization of reclaimed rubber. Exceptional opening for right party. Application will be held in strictest confidence. Address Box No. 765, care of INDIA RUBBER WORLD.

TIRE AND TUBE DEVELOPMENT, PROCESS, CONSTRUCTION and production engineers—Location, Pennsylvania. Address Box No. 769, care of INDIA RUBBER WORLD.

TIME STUDY AND MOTION ANALYSIS MEN—must have several years' experience with progressive company. Furnish complete history in first letter. Location away from Ohio. Address Box No. 770, care of INDIA RUBBER WORLD.

WANTED: CHEMIST, EXPERIENCED IN ALL phases of compounding molded rubber goods. Knowledge of synthetic and plastic compounding preferred, but not necessary. Eastern concern. Excellent opportunity. Address Box No. 771, care of INDIA RUBBER WORLD.

WANTED BY ONE OF THE SMALLER RUBBER FACTORIES IN Ohio a Tube room department head. This is a permanent position with good future opportunities. Prefer man with educational background and tube room experience. Address Box No. 772, care of INDIA RUBBER WORLD.

AN OHIO RUBBER MANUFACTURING COMPANY HAS AN opening for a Tire room department head. This is a permanent position and one with excellent opportunities for the future. Prefer man with experience in tire building and with some educational background. Address Box No. 773, care of INDIA RUBBER WORLD.

AN OHIO RUBBER MANUFACTURING COMPANY HAS OPENING for one or two experienced time-study engineers. Experience need not be in rubber, but this would be beneficial. Good opportunity for the right men. Address Box No. 774, care of INDIA RUBBER WORLD.

CHEMIST AND FACTORY SUPERINTENDENT TO take charge of Small Rubber Factory in Chicago Area. Excellent opportunity. Address Box No. 775, care of INDIA RUBBER WORLD.

CHEMICAL ENGINEERS—AS ASSISTANTS. NEW ENGLAND plant, 100% war work. Postwar future. Draft deferred. Subject to Stabilization Plan. Address Box No. 778, care of INDIA RUBBER WORLD.

CHEMISTS—ORGANIC. PROCESS CONTROL WORK IN NEW England plant, 100% war work. Postwar future. Prefer draft deferred and those with at least three years' experience. Subject to Stabilization Plan. Address Box No. 779, care of INDIA RUBBER WORLD.

PRODUCTION SUPERVISORS — NEW ENGLAND PLANT REquires services of two men with mill, calender, and tubing experience. Those with synthetic training preferred, but not necessary. Subject to Stabilization Plan. State qualifications and salary. Address Box No. 780, care of INDIA RUBBER WORLD.

CHEMIST—COLLEGE GRADUATE WITH SUPERVISORY ABILity. Experience, preferably in the manufacturing of synthetic rubber. State background with expected salary. Also enclose snapshot. All inquiries will be acknowledged. Address Box No. 782, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

CHEMIST, EXPERIENCED IN DEVELOPMENT and control of synthetic rubber compounds. Good postwar prospects with small organization. Give full particulars and salary desired. Address Box No. 784, care of INDIA RUBBER WORLD.

CALENDER FOREMAN

Capable of assuming responsibility for operations of rubber calenders in manufacturing coated textiles. Experience in application of synthetic rubber or vinyl compositions desirable. Eastern factory location. State age and all qualifications. Observe WMC rules. Box 645, 217—7th Ave., New York City.

SITUATIONS WANTED

FACTORY OR PRODUCTION MANAGER, PRACTICAL compounder in crude, synthetic, and reclaimed rubbers. Experienced in all phases of manufacturing of mechanical rubber goods. Address Box No. 766, care of INDIA RUBBER WORLD.

COMPOUNDER-ENGINEER, EXPERIENCED IN COMPOUNDING and manufacture of mechanicals, tubes, pneumatic and solid tires, natural and synthetic rubber. Trained in production management by large company. Chemical Engineering Degree. California location desired because of children's health. Address Box No. 781, care of INDIA RUBBER WORLD.

LATEX CHEMIST, 3½ YEARS' EXPERIENCE IN natural and synthetic compound development and technical sales. Address Box No. 787, care of INDIA RUBBER WORLD.

RUBBER AND PLASTICS CHEMIST AND DEVELOPMENT engineer with 17 years' experience in development and research desires position with postwar future. Has initiative, vision, ability, and record of accomplishments. Experience includes mechanicals, sundries, toys, packing, plumbers' supplies, non-slip surfaces, and reclaiming. Excellent health, age 34, parent. Prefer position as Assistant Factory Manager or Research Director of medium- or small-sized company or position in technical service. Location immaterial. Salary $5500. Address Box No. 789, care of INDIA RUBBER WORLD.

SUPERINTENDENT NOW EMPLOYED DESIRES CHANGE. Twenty years' experience as development engineer, cost and specifications engineer, and compounder of natural and synthetic rubber for mechanical rubber products. Capable as technical superintendent. Address Box No. 791, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 642)

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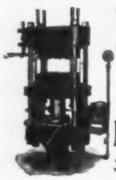

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Classified Advertisements

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Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 1—Watson-Stillman Hydro-Pneumatic Accumulator, 5½" ram, 48" stroke, 3000# pressure; 1—24x24" Hydraulic Press, 100 to 150 tons; 1—15x18" Hydraulic Press, 200-Ton, Hobing Press; 1—18x38" Farrel-Birmingham 3-roll Calender; 1—16x42" Calender, 3-roll, with drive and motor; 1—20x60" 3-roll Calender, herringbone drive; 1—Allen #3 Tuber; W. & P. Mixers; Dry Mixers; Pulverizers; Grinders, etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York 7, N. Y.

ONE USED HYDRAULIC PUMP, COMPLETE WITH RETURN tank, counter shafting, motor and switch. No priority required. $250.00 f.o.b. California. Address Box No. 768, care of INDIA RUBBER WORLD.

FOR SALE: ENTIRE LINE OF RUBBER MOLDS FOR PLUMBING supply, consisting of force cups, tank balls, basin plugs, sink stoppers, bath sprays, and 15 other items. Information and list of mold equipment furnished on request. RODALE MFG. CO., INC., Emmaus, Pa.

FOR SALE: ONE ROYLE TUBING MACHINE, #2, ALSO ONE Housatonic tubing machine, #2, fitted with ball bearing thrust, side delivery head, jacketed for hot oil heating. Address Box No. 785, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITY

MIDWEST RUBBER PLANT HAS MILLS AVAILABLE TO DO milling and mixing of reclaim and synthetic rubber. Address Box No. 788, care of INDIA RUBBER WORLD.

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(Classified Advertisements Continued on Page 643)

Classified Advertisements

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Continued

MACHINERY AND SUPPLIES WANTED

WANTED: 150- TO 200-TON, SELF-CONTAINED HYDRAULIC Press, with 1,000 or 2,000 pounds' pump tank and motor—down-moving ram, four-rod construction—36" x 12" between rods—6" to 8" stroke—about 18" daylight. Address Box No. 777, care of INDIA RUBBER WORLD.

WANTED: ONE SIZE 3A BANBURY MIXER, COMPLETE WITH motor. One 60" x 22" Mixing Mill, complete with motor. One high-pressure Hydraulic Pump, 10 gallons per minute, 2,500 lbs. pressure. Address Box No. 783, care of INDIA RUBBER WORLD.

WANTED: EQUIPMENT FOR PLASTIC MOLDING PLANT, INcluding Mills, Toggle Presses, Hydraulic Presses, Pumps, Rotary Cutters, Pre-Form Machines, Vacuum Shelf Driers. Send full details and prices. Address Box No. 786, care of INDIA RUBBER WORLD.

WANTED: TO BUY THREE PRESSES 36 x 36", OR SIMILAR SIZE, complete ready for use. Address Box No. 790, care of INDIA RUBBER WORLD.

WANTED: HYDRAULIC PRESSES WITH HEATED PLATENS, 150 tons and up, also Banbury Mixer, Vulcanizer at least 5' diameter, and other good equipment wanted for expansion program. Address Box No. 792, care of INDIA RUBBER WORLD.

PLANTS WANTED

WANTED TO PURCHASE, RENT, OR BUY INTEREST in small rubber plant manufacturing mechanical rubber goods. Address Box No. 767, care of INDIA RUBBER WORLD.

WANT TO BUY SMALL RUBBER PLANT MANUFACTURING patented articles. New York or New England area. Address Box No. 776, care of INDIA RUBBER WORLD.

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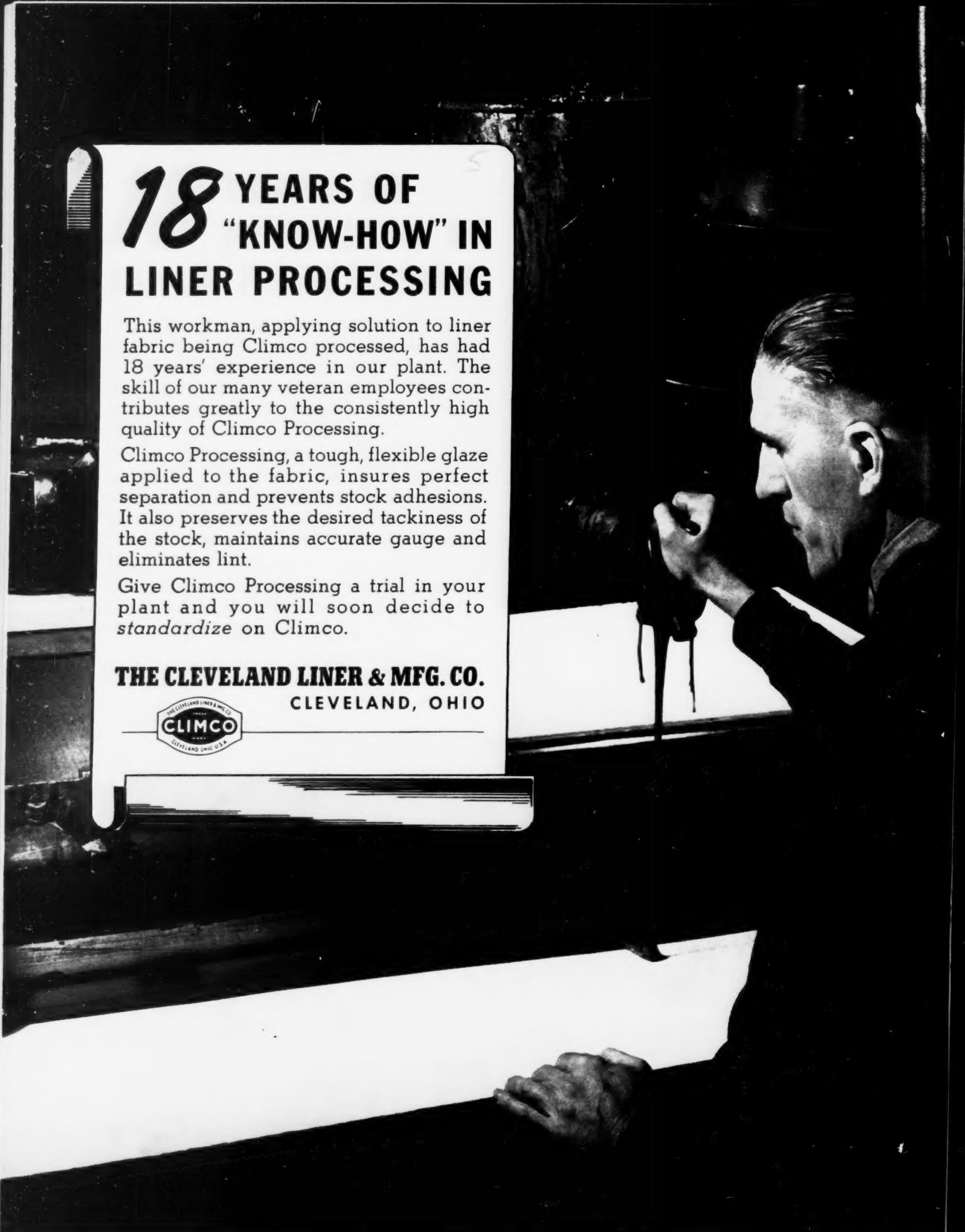

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